American Artisan

Founded 1880

The Warm Air Heating and Sheet Metal Journal

Vol. 96, No. 20 CHICAGO, NOVEMBER 17, 1928 $2.00 Per Year

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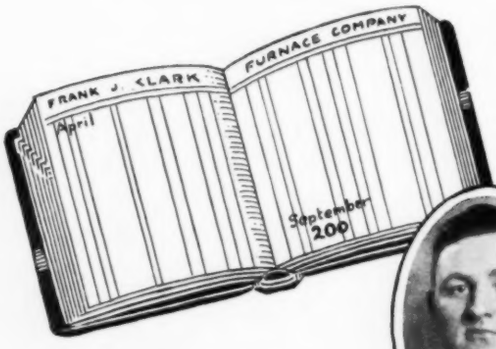

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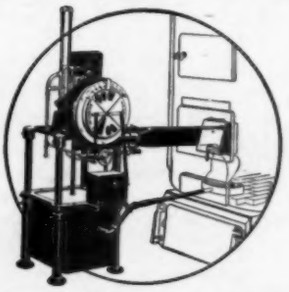

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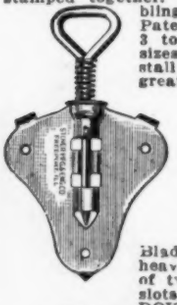

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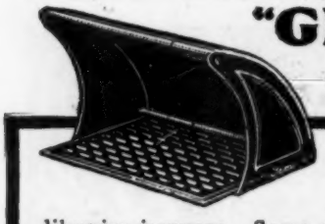

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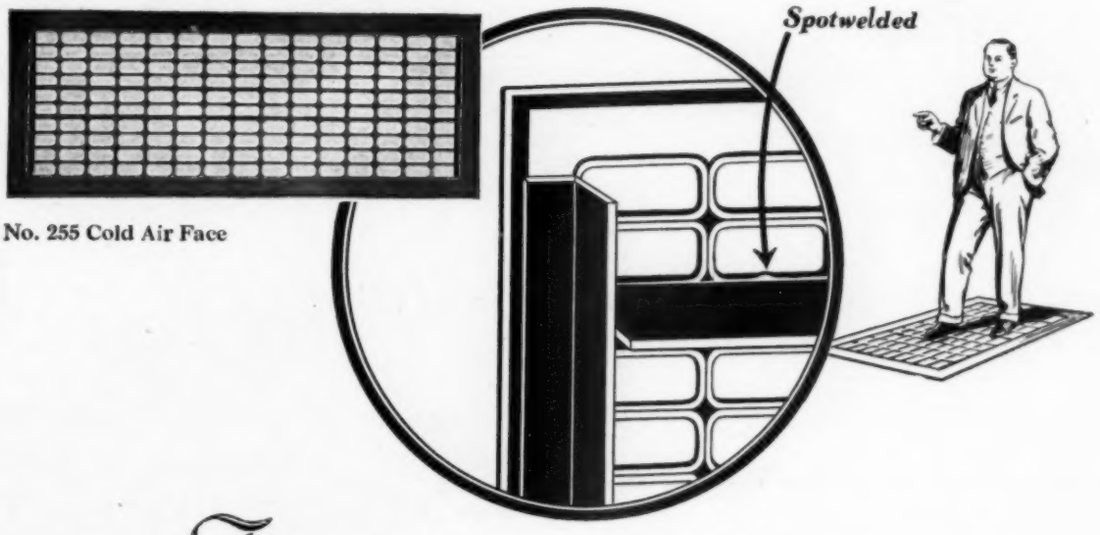
No. 5



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American Artisan

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A THOUGHT WAVE FROM THE ETHER

I believe that in the long run less damage is done through the mistakes resulting from sticking to decisions once made than would occur from getting into the habit of constantly worrying whether you had decided rightly or wrongly and changing your mind all the time. No man can get ahead on two or more courses. You have to go one way at a time to get anywhere.
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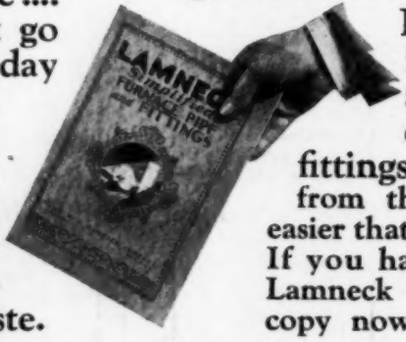

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American Artisan
The Warm Air Heating and Sheet Metal Journal

Vol. 96 CHICAGO, NOVEMBER 17, 1928 No. 20

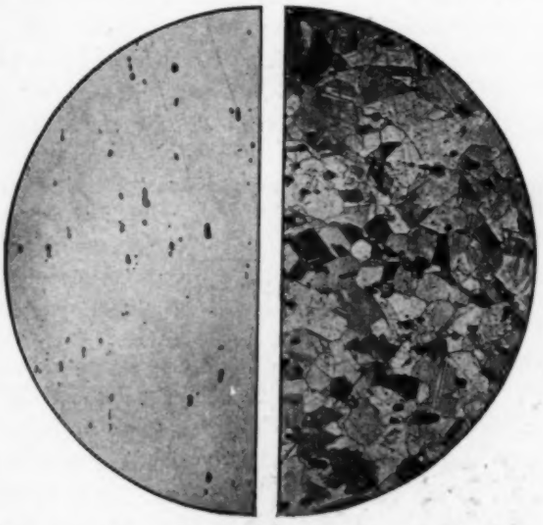
How to Weld Copper—Why Copper Is Difficult to Weld

Why Use of Completely Deoxidized Metal and Special* Copper Welding Rod Makes Good Results Possible

ALL welders who have had occasion to weld copper and to test the completed weld are familiar with the fact that the joint often shows a disappointingly low strength. This has undoubtedly tended to restrict the application of this useful metal as there are many places where copper could be used to advantage if it could be fabricated with high-strength, tight joints. It will be of interest to know that recent investigations have shown the cause of weakness and have furnished a solution to the problem, so that strong welds can now be made in copper.

For a long time it was thought that the weakness was in the weld metal itself, and numerous attempts were made to improve the quality of the weld. In spite of this test pieces still continued to break, but it was soon noted that with the improved quality of weld metal, the breaks occurred consistently outside the weld in the base metal along a line parallel with the vee. Tensile test specimens were found to break at practically the same load per square inch of base metal, regardless of the composition of the welding rod used. This seemed to indicate that the cause of the trouble lay in the base metal rather than in the weld. Examinations of specimens under the microscope proved that this line of reasoning was correct, and that the trouble was caused by the oxide present in ordinary commercial copper.

In order to understand why oxide should be present, it is necessary to review briefly the practice in refining and casting copper. The electrolytic refining process yields copper of extreme purity, the total impurities amounting to only about 0.01 per cent. But this copper must be melted and cast into ingot form for use, and molten copper has the unfortunate property of absorbing gases. Oxygen is readily absorbed forming a chemical compound called cuprous oxide, which dissolves in the molten copper. As a result, the purity of the molten copper drops to 99.7 per cent or even lower. Before casting, most of this oxide is removed by the "poling" operation which consists in covering the molten metal with charcoal and stirring with a green hardwood pole. The carbon in the charcoal and green wood remove the dissolved oxygen. But it is not customary to remove all of the oxygen; the cast slabs or bars as sent to the rolling mills contain 0.01 to 0.08 per cent oxygen in the form of cuprous oxide, and this minute amount is suf-



Figs. 1 and 2—Oxide Specks Scattered in Metal Before Welding

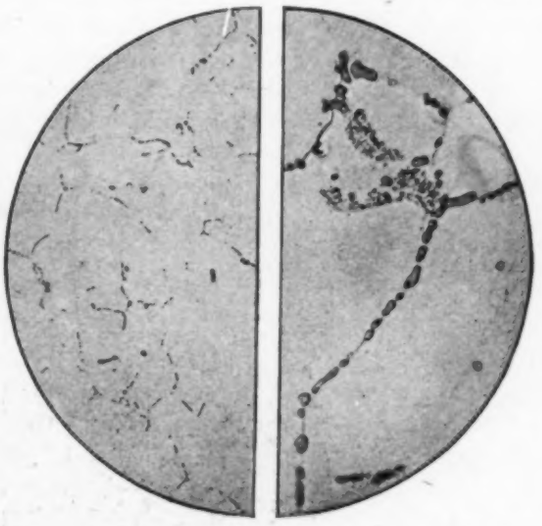


Fig. 3 and 4—Separation of Oxide to Grain Boundaries in Metal Adjacent to Weld

*Acetylene Tips.

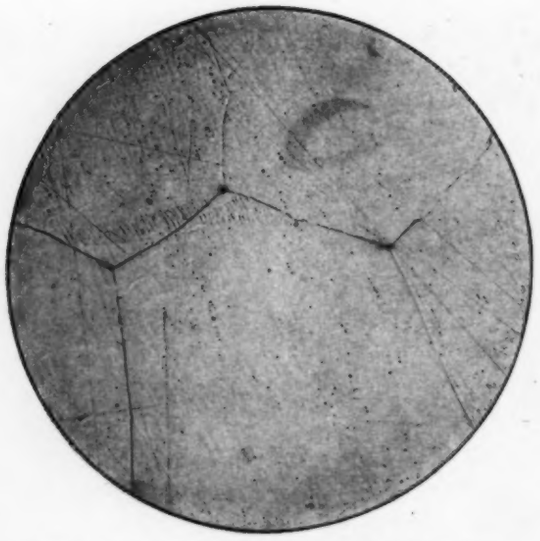


Fig. 5—Copper Completely Deoxidized With Silicon Shows no Oxide Specks

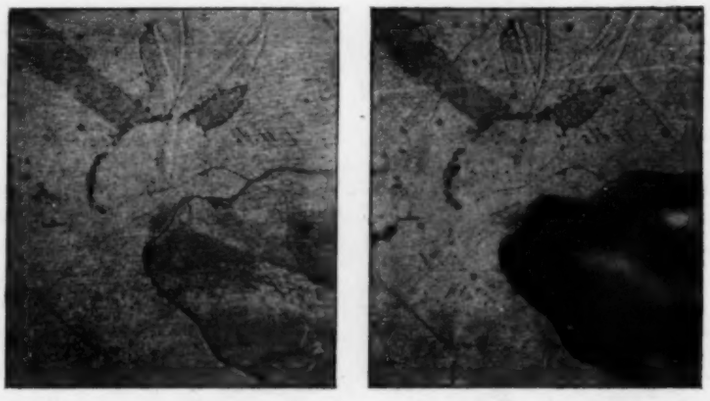
Fig. 6—Deoxidized Sheet Welded With Oxweld No. 19 Rod—Free From Oxide Crystal Separation

ficient to affect the welding properties.

Studies with the microscope have shown that when the cast copper cools the cuprous oxide present separates out along the grain boundaries. Each tiny grain of oxygen has numerous specks of oxide at the boundaries between adjacent grains. As the oxide is brittle and has little strength, the metal structure is weakened along the grain boundaries and fracture tends to take place along these lines.

During rolling, the original grains are broken up and the heating prior to rolling or the subsequent annealing results in the formation of new grains which bear no relationship to the old ones. As a result, the oxide specks are no longer at the grain boundaries but are scattered through the grains where they do not influence fracture. Well-made copper sheets and bars are thus strong, tough and ductile.

But what happens when a weld is made? The heat of welding is sufficient to cause the oxide specks to separate again along the grain boundaries of the base metal adjacent to the weld. This causes the zone of weakness in the base metal. Figs. 1 and 2 show how the oxide specks are scattered in commercial copper before welding, while Figs. 3 and 4 show the separation of oxide particles at the grain boundaries in the base metal adjacent to a weld. That oxide at the grain boundaries does cause weakness is evident from Figs 7 and 8.



Figs. 7 and 8—Oxide Crystals in Welded Commercial Copper Fall Out After Slight Bending

Since oxide is the cause of the trouble, copper containing no oxide at all would give better results. Deoxidized copper is made by adding silicon to the molten copper just before casting. In reasonable quantities it may be obtained from most manufacturers of copper as promptly as commercial copper sheet and at no increased cost. In ordering, it is well to specify "copper completely deoxidized with silicon." It should contain from .05 to .15 silicon to allow for loss of this element during welding.

Oxweld No. 19 copper welding rod meets all requirements for use with a base metal of this kind. It will give excellent results with such material.

Figs. 5 and 6 are photomicrographs of deoxidized copper plate and of weld metal made with deoxidized copper rod. Note the absence of oxide spots.

Average results of a large number of tensile tests are given in Table 1.

The large gain in strength and ductility when welding deoxidized plate is apparent. It could be further increased by hammering and heat treatment.

At a temperature above red heat, ordinary copper plate containing a small amount of cuprous oxide is quite brittle. This brittleness is at a maximum just below the melting point, at which temperature the copper has practically no strength.

Consequently, to test the weldability of copper, heat a piece bright red and hammer it vigorously on an anvil. If it breaks, it contains too

(*Continued on Page* 108)

Some Remarks on the Construction of Patterns for Copper Theatre Marquees

Work Found to Be Comparatively Simple with Proper Application of Geometry

By O. W. Kothe, Principal St. Louis Technical Institute

EVERY man carries a key in his possession to unlock something be it his room, house, auto, trunk, tool kit. But to find the key that unlocks the door to opportunity is a different thing. This requires a mental key and often many a turn is necessary before the tumblers fall to your bidding.

Men who look at these drawings and say they cannot make head or tail of them can take that as a sure sign their mental padlocks need exercise. The matter of playing around with geometry as met with in sheet metal designing and pattern drafting soon limbers up the mind to function faster, to perceive more closely, to act more quickly, to be more positive in your decision, and more stately in your working habits.

Take the design in our present drawing! The sketch shows it composed largely of straight lines, straight work; still it offers a grace and a beauty that many more highly ornamented marquees cannot equal. This job was installed for a motion picture house, having plenty of electric lights.

In this case the ceiling is paneled with beams, and a glass roof is stretched over the top, which makes a very attractive piece of work. The absence of ornamental or curved mouldings is noticeable. Usually when an Architect does not know what else to do, he makes flat surfaces and plants some stamped work in them, which, of course, is all right, but, we believe a plain design with straight lines has its merit.

It is generally only the better shops and the more expert workmen who are put on such jobs. Men who are rough and clumsy will never do as beauty culturists.

Many shops never know why their bid is not accepted because it must be low. That may be just it; too low to do a respectable job, and the Architect has the power to say who shall have the job, even if it does cost some more.

The matter of detailing a marquee as we show is extremely simple, yet to conceive the idea is the hardest. It is only men who do real creative work who appreciate something different, as we know how hard it is to get away from the old stock designs and methods. In studying the sectional views, we see the skeleton of the canopy's structural steel, channel bars, I-beams, and angle bars as well as T-bars. This structural work is put up by the structural iron workers, and it becomes the sheet metal worker's task to wrap the copper designs around the steel shapes and to fasten same.

As we go to press a wire from R. J. Jobst, Peoria, Illinois, informs us that Charles N. Louis, owner of the Peoria Roofing Company, Peoria, and Past-President of the Illinois Sheet Metal Contractors' Association, died Friday morning of this week. Mr. Louis' funeral will be held at 9 a. m. Monday, November 19. A full account of Mr. Louis' life and activities will be published next week.

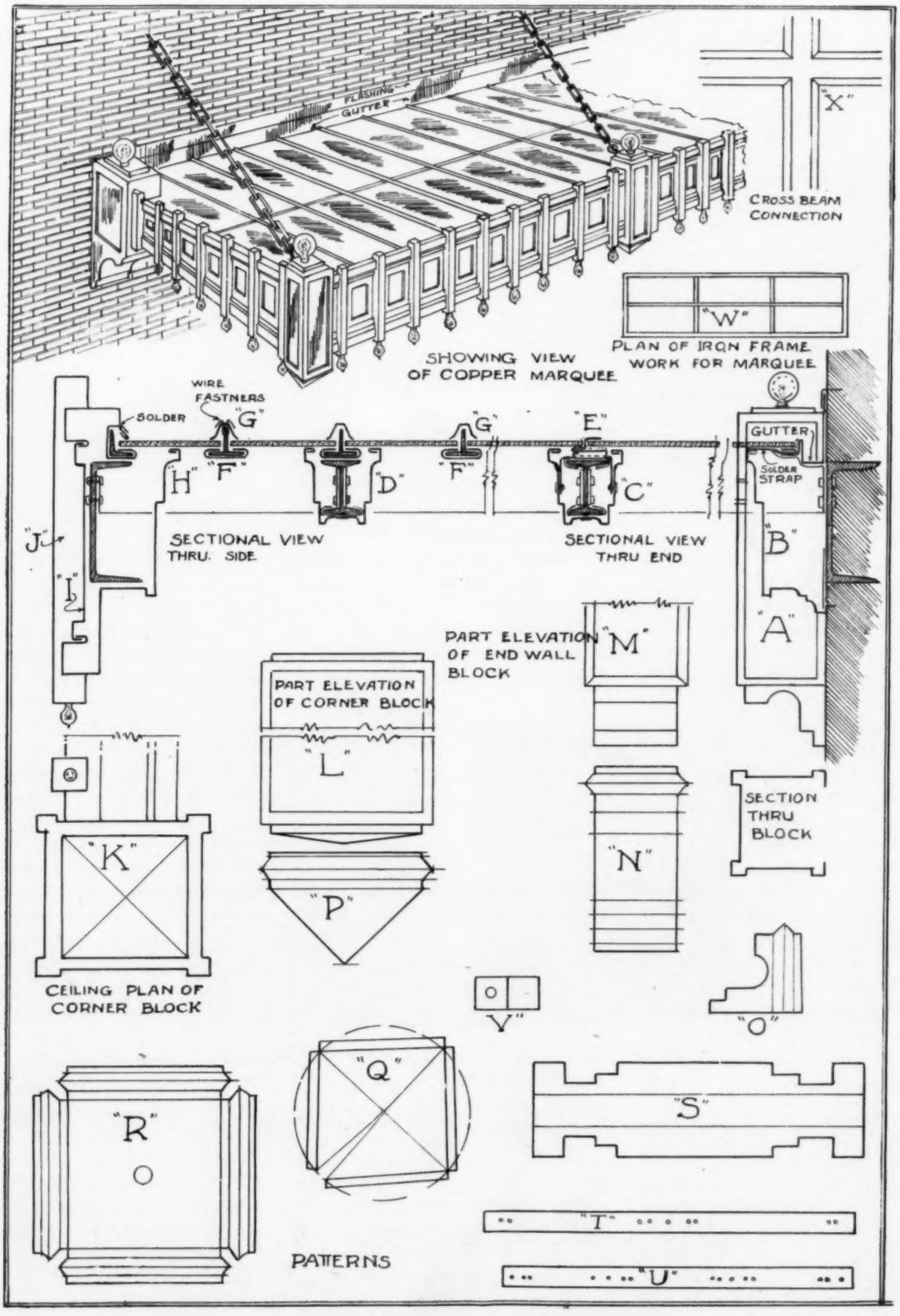
Possibly, the glass bars, are the easiest, being made of T-bars. Here, a copper cap strip is clamped over the lower flanges as at "F," so the glass does not come in contact with the rigid steel work. These cap strips have run along the top in which the glass is pressed and as such the copper strips make a softer bed than the steel bar, aside of the covering of the underside. The wall blocks are made as in detail "A," and the wall mould "B" butts right against the side of these blocks. Then the panel beams are decorated with metal sections as at "C" and "D" where we show how the metal is tied to the I-beam.

In the center of the roof, a cross bar as at "E" is run, because long lengths of glass are not advisable, owing to breakage.

Smaller lengths are easily replaced and at less expense. Over the glass edges along the T-bars, a cap strip "G" is built, bending a saddle, and anchoring it to the steel bars by means of copper wire. A hole is punched through the fin of the bar, which enables running a wire through. The front is made up of a moulded beam "H" on the inside which is a duplicate of "B," while the outside is paneled as at "I." The posts "J" are planted at intervals and set in position as the part plan "K" shows.

For instance consider the rear block "A" where a partial front view is shown at "M." The pattern then will be quite straight as at "N," only the corner offset needs development, and a square miter does that. The block itself is straight at the top and bottom and the metal is formed as the section shows. The girth strip is shown at "U." At "O" is the side pattern for the block bracket, also a flat piece with a square miter for the offset. Such miters can easily be marked off with a 45-degree triangle, or by just measuring a square and drawing a diagonal line, which would bear a 45 degree.

The front block "K," is shown in a partial elevation as at "L," with the pattern at "P." Some men prefer to make the inverted pyramid in one piece as at "Q," but either method is satisfactory. No doubt the method at "P" has its advan-



Details and Patterns for Copper Marquee

tage in both development and in assembling. At the top of block, a cover is built, similar as we show at "R," which is formed, and built in the section as detail "K" would indicate. A half girth for this section "K" is shown at "T" and the bending marks for the girth.

The panel "I" of sectional view,

can be a long piece with narrow raised parts built in, or they can be added to the post "J" if desired. Thus it is possible to make the post pattern "S" to include the narrow vertical bar for making the panel. There will be a waste of copper either way this connection is made, and so it is best to select a design that has labor saving elements connected with it. The bottom of the post can be made as at "V" punching a hole to allow the electric fixture to fit. The top would be similar, only no hole would be made.

The matter of development is extremely simple, and that is the general rule with the vast majority of sheet metal work. It is for this reason that so many tradesmen can get along without a very comprehensive knowledge of drafting. The masses of men make something, whether it follows a geometrical line or not—it is something, and to them it is no doubt the apex of achievement. In estimating such work, the task resolves itself largely into arriving at the correct girth required for each beam and other ornamental feature. But it is not the material alone that counts so much as the labor it takes, and here is where the rub is with most men and shops.

Possibly one of the hardest items to fix up to look well are the miters beneath the cross beams "W," as the detail "X" indicates. This is a difficult position to connect up the edges and make them lay well. On very classical jobs these beam connections present the one sore spot. Men try to solder them overhead; they try to use metal screws and what not else. But it only stays in place while the men are on the job, and soon the vibration of trucks and street cars cause the metal to resume its normal shape, to stand open and be a sore spot. Some men muss around with a hammer and bruise the metal, trying to have it lay up well, and the metal once buckled will be an eye sore forever.

I believe it far better to make these cross beam connections on the ground, where solid bottoms can be had for assembling and riveting as well as soldering. I believe the one beam should be made to run clear along on the bottom, not trying to make any miters. Then the other cross beam is butted into the side and the miter so cut gives the appearance of a miter, but is really only a butt joint. Here every effort must be made to protect the edges so no roughness is allowed to remain. When the entire ceiling beams are put up as a unit, it will take more help, but a better job will be done, and the joints can then be made as at "B" and "H" and such end positions as at "H." These positions are easier to get at and do a better job with on the job; then the cross beams as at "X."

Most shops make these beams as "C" and "D" in short lengths, and send one man on the job, expecting him to get it done in estimated time and still do a beauty specialist's job. But in most cases both items suffer, simply because the shop owner figured his prices at so much material, labor and profit—not realizing he was to be paid for beautifying the building. So builders must sell beauty, artistic display, neat workmanship and marvelous construction. Then ask a price to enable doing the work that way and stand up for it. Then hire men who understand geometrical lines and they will do a good job. No shop need expect outside roughing in men who do not know anything about geometrical lines to do a respectable job. Roughing in men are too limited in their sphere of usefulness and if they will not prepare themselves to understand geometrical lines then they must content themselves the rest of their lives with rough and dirty work.

Indiana Sheet Metal Men Hold District Meeting at La Fayette December 7th

Plans for the district meeting at La Fayette, Dec. 7th, of the Indiana Sheet Metal and Warm Air Heating Association are well under way. John Balkema, who has from time immemorial been secretary of the La Fayette organization, is functioning actively as chairman of the local committee in charge of arrangements. The other members of his committee are Julius Newmann, Ernest Kalberer, Wm. Strate, James McDaniels, Jouis Lehnen and Wm. Balkema, all of La Fayette.

La Fayette has established an enviable reputation for entertaining out of town guests at certain dinners they have thrown in the past and they know that the only way that they can hope to live up to this reputation is by following the same procedure as before, by having a dinner in the large room over John Balkema's shop.

While the officers of the State Association are not even suggesting that Balkema's committee take upon themselves the burden of handling the meeting in this way, it is no secret that they will be more than glad if the committee voluntarily adopts such a plan.

It is well known by those who have been included in the La Fayette hospitality at former meetings, that Ernest Kalberer has been in charge of the dinner arrangements and that he has acquired more than local fame for dinners inadequately described as "dutch lunches."

The room over Balkema's shop is sixty feet long and thirteen feet wide. It is well lighted, well ventilated and clean and will accommodate one hundred or more guests at one long table. The shop is located at 104 Main Street, which is within a block of the Court House

The meeting on December 7th will be open to all sheet metal and warm air heating contractors in the State, and it is hoped that contractors from the entire northwestern part especially, will take advantage of this opportunity to meet. Salesmen, jobbers and factory representatives selling to the Indiana trade are also invited to attend and will be given a cordial welcome. As has been the case with other district meetings, the association will depend upon the trade publications to issue their invitations and it is hoped that each contractor and material man will look upon this word as his personal invitation to be present.

Public Beginning to Realize That This Is a Steel Age in Which We Live

Canning Industry Showing Increase in Tin Plate Consumption

By B. F. McMahon*

MR. FERNLEY has asked me to make a few remarks regarding market conditions. While I think he had in mind conditions as they might apply particularly to sheets, I am going to give you a little review of conditions as the industry finds them in connection with what are known as the major steel items.

Our very competent trade papers follow market conditions very closely. I cannot, therefore, hope to add to such knowledge as you may have obtained from such publications.

Pig Iron and Steel Markets Active

Pig iron, of course, is the basic commodity for steel products. The producers of pig iron are at the present time in the midst of a very active and advancing market, with some suppliers out of the market for deliveries over the balance of this quarter.

The bar business has been very satisfactory. Deliveries are becoming extended, with prices definitely on the upward trend.

The building business, involving largely structural steel, is likewise active, particularly in certain metropolitan districts.

The rail business has been good this year, with prospects for an equally good year in 1929. On the other hand, the car and railway equipment business has left a great deal to be desired.

The pipe business has shown a substantial increase in the amount of business being placed. Conditions there are regarded as having shown a satisfactory improvement.

The general wire business is also showing improvement, with nails going a little slowly, due to good inventories.

There has been a decided falling off of tin plate during the past few weeks after a remarkably good production since the first of the year. On account of the damage done to such items as tomatoes and corn by the tropical storms, which were felt particularly in the southeast during the middle of August, the final pack of these items, particularly tomatoes, has been disturbing, some packers reporting as low as 20 to 45 per cent normal pack. Other items of consumption of tin plate, however, such as general line and oil cans, are being well maintained. With a short pack this year, 1929, if weather conditions are at all favorable, ought to be an excellent year for the marketing of steel in the form of tin plate.

Public Recognizes This Is Steel Age

I assume that all of you are more interested in sheet steel than in any other single steel item. I quote from a report made by the sheet steel trade extension committee: "Sheet steel consumption is increasing. The general public, recognizing that this is the steel age, is becoming more conscious of the value of sheet steel. Its durability, its protection against fire, its adaptability, the possibilities it offers for the application of beautiful finishes, its strength and the economies that may be effected through its use, all are becoming more and more matters of accepted fact. In 1926 only one division of steel products exceeded in tonnage the steel that was rolled into sheets."

From such information as I can obtain, I believe that jobbers distribute approximately 16 per cent of the production of sheets in this country and that, of course, is largely galvanized. We have had a condition for many months past where the tonnage has been good, production satisfactory, but prices very unsatisfactory. Unless the sheet steel producers are in a satisfactory position with respect to price levels, it naturally follows that the jobber or distributor likewise cannot be happy. You are a very important factor, I should say, the most important factor, in the distribution of galvanized sheet steel. Anything, therefore, that we can do to conserve our mutual interests should be done. There will, of course, be occasions when we may have honest differences of opinion, but those occasions are rare.

It is estimated that there are close to 5,000,000 tons of sheet steel produced and consumed in this country, of which, perhaps, 35 per cent goes into the automobile industry, the balance being distributed throughout an extremely varied type of consumption, such as harvesting machinery, range boilers, barrels, steel passenger and box cars, building construction, stoves, pipe, tubing, lockers, steel shelving and metallic furniture. The market, therefore, being widely distributed, represents a very healthy basis.

Conditions in Sheet Steel Better Than in Several Years

Present conditions in the sheet steel industry are, perhaps, better than they have been for several years. Prices have advanced and sales resistances to those advances have practically disappeared. Deliveries have become extended and, according to certain reports, the automobile industry in some instances is having difficulty supplying its early

*Delivered at Metal Branch meeting of the National Hardware Association, Atlantic City, New Jersey, Tuesday, October 16, 1928.

needs. I think that we can say that we have a very good prospect facing us over the period of at least the next few months. The sheet steel industry is promising better returns and you as distributors will paraticipate to advantage in this better market.

There has been a good deal said during the past years about steel capacity being large and too little said about the constantly increasing consumption of products made from steel. Take the matter of the two items in which I am particularly interested, namely, sheet and tin plate, which touch almost every home. Sheet steel is a big item in the manufacture of automobiles. It has not been very long ago that you and I thought that one car would be all sufficient for our family needs. Today we require at least two cars. Our daily family program cannot possibly be maintained without these facilities for quick transportation.

Take the other item of tin plate as represented in containers for canned goods. The quality and standard of canned goods have so progressed during the past ten to fifteen years that today there is absolutely no prejudice among properly informed people against food packed in that manner.

The large producers of sanitary cans (which is a term we apply to cans for packing wet foods, such as soups, vegetables, fish, meat, etc., and in the manufacture of which cans no solder can get in touch with the food) state that there is a natural increase in the consumption of canned goods approximating 8 to 10 per cent per year, which means that in ten to twelve years the consumption of steel in the form of such cans will be doubled.

In conclusion I would like to touch on what might be termed as an "Industrial phenomenon," which has been the maintenance of high wage rates during periods when proper returns to the owners of steel property could not be realized. It has become widely recognized that high wages are necessary and coexist with national industrial prosperity. It is interesting to note in this connection from the report made for June of this year by the National Industrial Conference Board that the average weekly earnings paid in the iron and steel industry were $33.87, as compared with $27.30, the average for twenty industries. I do not believe that this subject of prosperity and high wages has been more clearly stated than by E. G. Grace, president of the Bethlehem Steel Company, in the October 9th issue of the *"Bethlehem Review,"* a bulletin of news for the employes of the subsidiary companies of the Bethlehem Steel Corporation. I quote his remarks (to which some publicity has already been given):

Must Protect Buying Power of Wages

"American industry faces no more important task than to protect the buying power represented by wages. In the last ten years a new order has been created in our economic life. It is recognized first, that high standards of living are based on the greater earning power of labor and second, that continued prosperity and high wages go hand in hand.

"Progressive industrial management seeks, therefore, to enable employes to earn wages as high as can be paid. Even when profits decline or business falls off, efforts are made to economize in other ways than by cutting wages. But management alone is powerless to maintain high wages. They can be paid only so long as economic conditions will permit them to be paid.

"One of the chief factors affecting this ability to pay them is foreign competition. With European wages far below American wages, and consequently costs of production lower abroad, European manufacturers can compete on equal terms with the products of higher paid American labor.

"This fact vitally concerns every American worker. Naturally we are all interested in European progress, but economic improvement abroad can be accomplished without sacrificing American wages and living conditions. Foreign standards can be raised without reducing ours.

"Responsibility in part for protecting his wage rests upon the individual, both as an employe and as a citizen.

"As a wage earner his responsibility is to help increase production and reduce costs, so that his own company can meet competition, sell its products at a profit and thus continue to pay the highest possible wage. Paying men on the basis of individual merit, as discussed in this *Review,* is one way to increase wages and reduce costs.

"As a citizen the employe's responsibility is to take an active, intelligent interest in company and public affairs. We have reached a point in this country today where thousands of employes are also stockholders, with both a payroll and company interest in continued prosperity.

"Certain it is, therefore, that as wage earners, stockholders and citizens our outstanding interest is an economic one. If we are mindful of that fact and act accordingly we shall co-operate with each other to promote our company's prosperity and see to it that nothing is done to disturb American living standards which have taken us so many years of hard work to establish."

Mrs. M. F. Liebermann, Wife of Penn. State Sheet Metal Contractors' President, Dies

After an illness of several years, Mrs. M. F. Liebermann, wife of M. F. Liebermann, president of the Sheet Metal Contractor's Association of Pennsylvania, died at her home at Ambridge, Pennsylvania, and was buried recently.

She was of a cheerful and lovable disposition, and had a host of friends as was evidenced by the many beautiful floral tributes sent to the home.

She is survived by her husband, one son and one daughter.

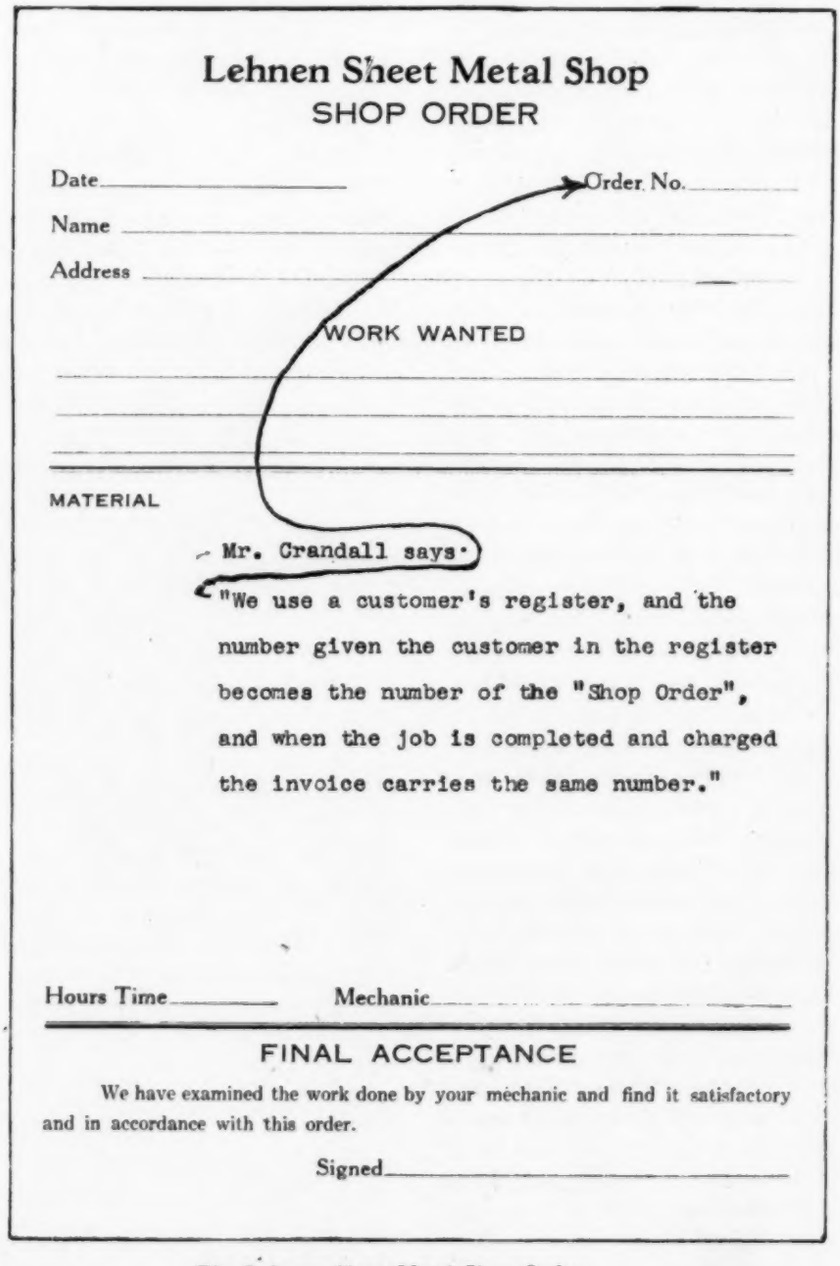
The many friends, Mr. Liebermann has made in the sheet metal industry, extend their sympathy to him and his family in their bereavement.

Shop Order Becomes Powerful Instrument If Properly Designed

Lehnen Sheet Metal Shop, Grand Rapids, Mich., Gets Good Results from Shop Order

BELIEVING that many disagreements between customer and contractor arise because of a lack of thorough understanding of what is wanted, some sheet metal contractors have endeavored to insure against unpleasantness of this sort by making a shop order sheet showing the exact amount of work to be done, the materials used, the hours of labor on the job and the name of the mechanic or mechanics who did the work.

H. D. Crandall, proprietor of the Lehnen Sheet Metal Shop, 1009 Division Avenue, S., Grand Rapids, Michigan, has worked out a very convenient yet simple form, which he says fills the bill very nicely and avoids disagreement over labor and material, while at the same time obtains an acknowledgment of the bill from the customer.


Lehnen Sheet Metal Shop
SHOP ORDER
Date
Order No.
Name
Address
WORK WANTED
MATERIAL
Mr. Crandall says·
"We use a customer's register, and the number given the customer in the register becomes the number of the "Shop Order", and when the job is completed and charged the invoice carries the same number."
Hours Time
Mechanic
FINAL ACCEPTANCE
We have examined the work done by your mechanic and find it satisfactory and in accordance with this order.
Signed

The Lehman Sheet Metal Shop Order

The accompanying illustration shows the form used by Mr. Crandall. Some additional explanation is necessary to make clear just how form is used. At the top, of course, is the date, the name and address of the customer, and the order number. The order number is important. In connection with this shop order, the company uses a customer's register. As the orders come in they are posted in the customer's register. Then the customer's order number is placed upon the shop order. The work is listed, as are the materials to be used, on the shop order. When the final bill is rendered, the shop order is sent to the customer, whose signature is secured if the work is satisfactory. If the work is not satisfactory, the customer is duty bound to state the nature of his disagreement at once. He either pays or must show cause why he should not pay the amount stipulated when the work is completed

In this manner the contractor has in his job sheet, when it is returned to his office by the customer, a signed statement that the work is satisfactory and the materials as represented. With this instrument in his files, the contractor has a pretty good lever to use in case of non-payment.

But the main factor is not alone in the protection which it gives the contractor, but the psychology it carries with it. The customer is given the idea that the contractor is open and above board in his dealings. He shows the customer that he is not making an exorbitant profit by overcharges, and shows the customer how he can verify the works

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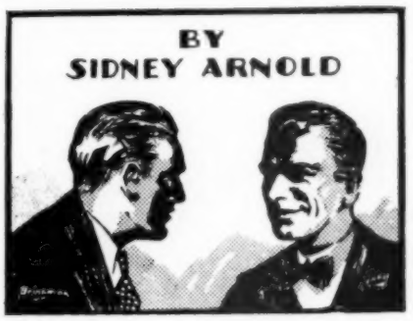
Lamson & Sessions Co. to Erect Plant at Birmingham, Ala.

Lamson & Sessions Co., Cleveland, will build a bolt and nut plant in North Birmingham, Ala., on a tract of 8½ acres, recently acquired.

RANDOM NOTES AND SKETCHES



Friday of last week was visiting day in our office. A group of notables came in to see us in the persons of R. C. Walker, President; Jesse T. Groves, Illinois representative, and L. D. Burroughs, Sales Manager and N. J. Fiala, sales representative, of the Midland Furnace Company, Columbus, Ohio. This new organization is stepping right out and taking its place in the ranks of the manufacturers of warm air heating equipment, and the prospects for its future development are very good indeed, according to the expressions of these three men.

* * *

"Clara," her father shouted upstairs, "I think that bashful young man of yours is out on the porch."

"Why, Pa," exclaimed Clara, hustling down the stairs three steps at a time, "I didn't hear him ring."

"Neither did I," admitted her father, "but I heard his knees knocking together."

* * *

Mother—"Johnny, you've been fighting again. What is that bruise on your head?"

Johnny—"I wasn't fighting at all. That was a mistake."

Mother—"A mistake?"

Johnny—"Yes, I was sitting on that little mutt Bertie this morning and I forgot to hold his feet."

* * *

Some people wonder what the Mormon wedding ceremony is like. It's something like this:

Preacher (to groom)—"Do you take these women to be your lawfully wedded wives?"

Groom—"I do."

Preacher (to brides)—"Do you take this man to be your lawfully wedded husband?"

Brides—"We do."

Preacher—"Some of you girls there in the back will have to speak louder if you want to be included in this."

* * *

Painful Confession.

Bill was in tears when he came home from school.

"Teacher whipped me because I was the only one who could answer a question she asked the class," he sobbed.

His mother was indignant.

"Why, I'll see about that? What was the question, Billy?"

His eyes lighted reminiscently.

"She wanted to know who put the glue in her ink bottle!"

* * *

Trespassing in 1952.

Jones—"Smith, will you quit flying your airplane through my air, or have I got to install a vacuum over my front lawn?"

* * *

A Falling Market.

A farmer's wife shipped a crate of eggs to a wholesale house in a city, but before doing so, she wrote on one of them: "I got two cents for this egg. What did you pay for it?" And she added her name and address.

A year later she received an answer. It was written on the highly embellished stationery of an actor. "My dear madam," wrote he, "while playing the part of Hamlet, in the Far West, recently, I received your egg for nothing."

* * *

Brave.

The dentist was telling about his pluckiest patient.

"He came into the surgery and began to tell me he had no faith in gas, ether or cocaine. 'The tooth's been giving an awful lot of trouble,' he said, 'and all you've got to do is to hunk it out—hunk it out.'

"I congratulated him on his pluck and asked him to sit down in the chair. 'Oh, no!' he exclaimed. 'It's not for me—it's for my wife. She's in the waiting room.'"

* * *

Impossible Now Days

Bridegroom—"Would you mind if I went into a smoking compartment for a little while, dear?"

Bride—"To smoke?"

"Oh, no! I only want to experience the agony of being away from you, so that the joy of my return will be all the more intensified."

* * *

Sally—"I am the happiest woman in the world. I am marrying the man I want."

Modern Friend—"Yes, but true happiness comes to a girl by marrying the man somebody else wants."

* * *

She—"If I die, what should you do?"

He—"Oh, the same as you would do yourself."

She—"You wretch! I have always suspected it."

* * *

Household Hint

Two of your daughter's old evening gowns, sewed together, will make an excellent pen-wiper.

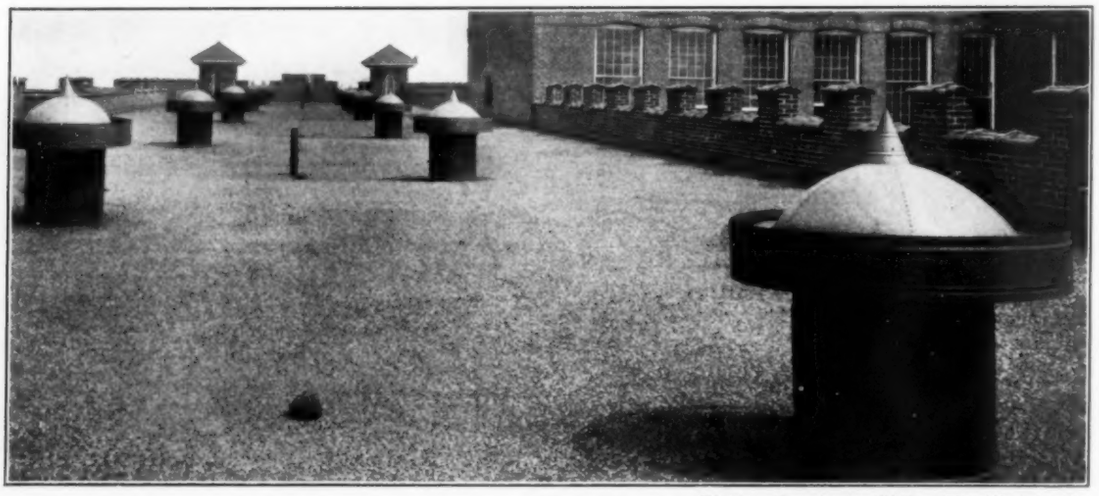


Photo Courtesy Globe Ventilator Co.

A Portion of the Roof of the Royal Typewriter Company Upon which 33-30-Inch Ventilators Have Been Installed

IND

Be

THIS is the fifth of the series of articles on Industrial Ventilation. In the fourth article ventilation of schools and moving picture theaters was mentioned. These buildings are public buildings of a non-industrial nature. Reference was made to them as they were among the first types of buildings to offer conditions suitable for a careful study of the results of ventilation.

As a research problem, the ventilated schoolroom shows the effect of proper ventilation on attendance, health, and alertness of pupils. The theater is a good example of the effect of comfort on the returns from the box office. The results of studies on these classes of buildings furnished the basis for the design of ventilating systems especially adopted for industrial buildings.

In some of the previous articles, figures used by ventilating engineers were given with a statement that additional figures would follow in future articles. All of the figures are based upon the fresh air requirements. Some are expressed in cubic feet per minute and others in the minimum number of air changes per hour required.

Some of the best authorities have recommended the following table for the ventilation of the various classes of buildings. This table, although far from complete, should serve as a guide in determining the ventilation needs of other classes of buildings.

Air to Be Removed from Enclosures

Room	C.F.M. per occupant	Minimum air changes per hour
Assembly and convention halls	30	8
Boiler rooms	.....	10 to 12
Engine rooms	.....	8 to 10
Factories	20 to 30	4
Foundries	.....	4
Mill buildings	20 to 30	4
Offices (large)	20 to 30	.....
Private offices (large)	.....	6
Public offices (large)	.....	4 to 8
Public offices (small)	.....	6
Public toilet rooms	.....	10
Public waiting rooms	.....	4 to 6
Pump rooms	.....	8 to 10
Roundhouses	.....	12
Toilets	.....	10
Waiting rooms	.....	4 to 6

Although the figures given in the table would serve well in general practice, there are extreme cases even in the classes given where the figures given are insufficient. In such cases, good judgment must be used and due allowance made for the exceptional conditions. Also some classes of buildings will require far more air changes than any given in the table and anyone qualified to install a ventilating system would be qualified to estimate additional needs.

Figure 1. Roof of the D. M. Ferry Seed Company

Once the fresh air requirements are known, the problem is to know the locations, numbers and sizes of ventilators. Proper location of ventilators is of importance. They should, of course, be advantageously placed with reference to areas which they are to serve. If it is a question of the removal of dusts or fumes, the ventilator should in all probability go immediately over the spot where the fumes or dusts are formed. The highest points on the buildings should be given preference in locating ventilators; quite frequently though light shafts and

*Professor of Mechanical Engineering, Department of Mechanical Engineering, Kansas State Agricultural College, Manhattan, Kan.

DUSTRIAL VENTILATION

Increases

As Manufacturers Become Better Acquainted with Resulting Increased Worker Efficiency

By PROFESSOR A. J. MACK*

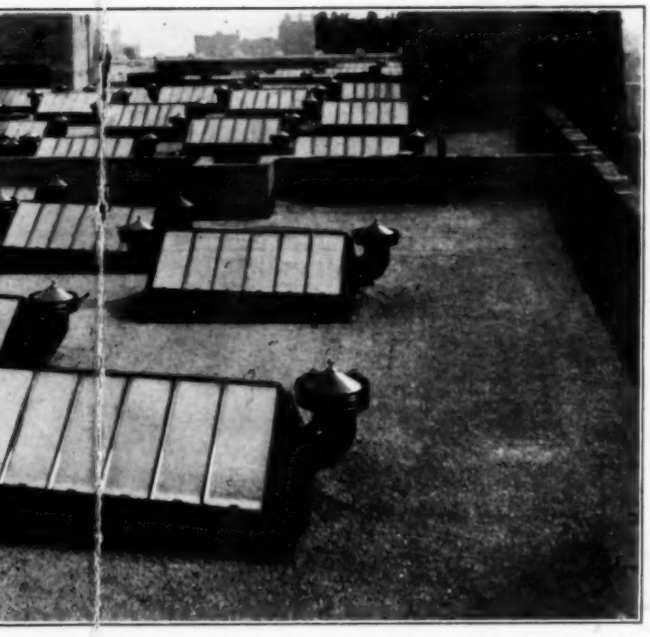


Photo Courtesy Burt Manufacturing Co.
mpany, Detroit, Michigan, Used in Connection with the Raised Skylight.

elevator shafts may extend above the ventilators.

The manufacturers of Burt ventilators recommend that ventilators be placed about 20 feet between centers and if possible on the highest points on the roof in buildings of a maximum width of 50 feet. On wider buildings some ventilators should be placed on the ridge; others part way down the slope. Staggering on the roof is often advantageously resorted to.

One of the accompanying illustrations shows the arrangement of the ventilators and skylights on the roof of the D. M. Ferry Seed Company in Detroit. By use of the raised skylights for the light purposes and the ventilators for air removal a convenient arrangement of lighting and ventilating is possible. This is a much better arrangement than would be possible if the skylights were adjustable and served as ventilators as well. With this arrangement the direction of the wind does not affect the ventilation. A glass top ventilator would, however, serve the same purpose, except for a more limited amount of light.

This type of ventilator will be discussed along with the other types in later articles.

This same company suggests the following formula for determining the size of ventilators to be used:

$$\frac{C\,N}{60\,V} = C.\,F.\,M.$$

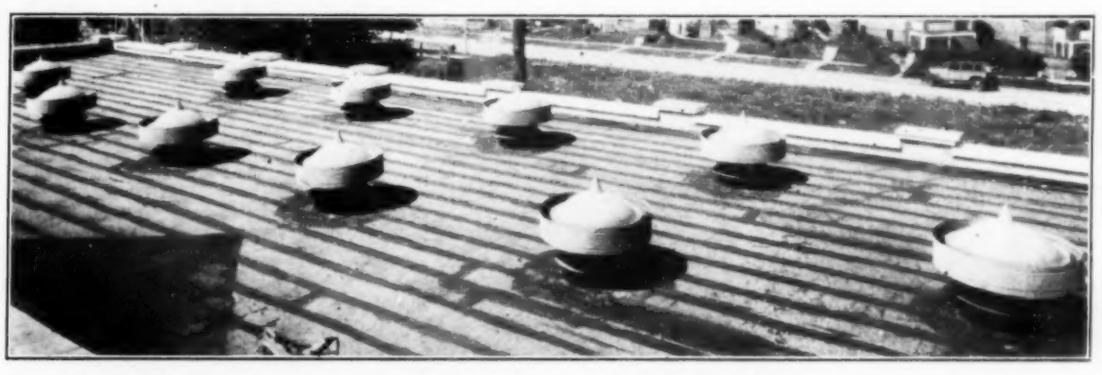
C = volume of room in cubic feet.

N = number of air changes required per hour (determined from table).

V = number of ventilators to be used.

C. F. M. = number of cubic feet of air to be exhausted per minute by each ventilator.

Most manufacturers have tables of the capacities of various classes and sizes of ventilators, thereby making the selection of sizes of ventilators comparatively easy, providing the tables are properly used.



Roof of Power Plant of Union Electric Light and Power Company, St. Louis, Missouri.

Courtesy Edwards Manufacturing Co.

A Large Industrial Ventilator Ready for Shipment to the Building Upon Which It Was Later Installed

Unfortunately most ventilator tests have been run under varying conditions, so tables are not comparable, unless the wind velocities, temperature differences, etc., were the same in each case.

For showing how the formula may be used the following manufacturer's table is given.

Anemometer Tests of Burt Ventilators

Wind velocity 5 miles per hour; temperature difference 10 degrees.

Cubic Feet of Air Per Minute

Size	Sliding sleeve damper ventilators	Hi-efficiency cone damper ventilators	Rotary
12-inch.....	200	250	280
14-inch.....	280	350	375
16-inch.....	380	475	495
18-inch.....	480	600	645
20-inch.....	600	750	825
24-inch.....	840	1,050	1,110
30-inch.....	1,280	1,600	1,700
36-inch.....	2,000	2,500	2,550
42-inch.....	2,640	3,300	3,450
48-inch.....	3,440	4,300	4,475
54-inch.....	4,320	5,400	5,600
60-inch.....	5,120	6,400	6,845
66-inch.....	6,240	7,800	8,300
72-inch.....	7,800	9,750	9,875

One or more of the later articles of this series will be devoted to a discussion of a series of comparative tests on automatic roof ventilators of various kinds at the Kansas State Agricultural College, since these tests were conducted on the same size ventilators and under identical conditions.

Claims made by some manufacturers may at first be very surprising and yet when test conditions are taken into account there are some grounds for claims. In some cases, however, claims are rather exorbitant, except possibly in extremely favorable conditions.

It is quite an easy matter to make use of colors and numerous arrows to indicate the paths of the gases and the quantities of gases passing through a ventilator, but what the user is interested in is the operation of a ventilator under his actual operating conditions.

With the same internal ventilator resistance and with the same temperature differences, humidity conditions, elevations, etc., presumably the only difference would be the effect of the winds in producing additional draft through the ventilator. The tests were conducted primarily to get the effect of the wind on the various classes of designs. Information concerning the results obtained will no doubt be of interest to sheet metal men, architects, and ventilating engineers in general as well as to the prospective customers. The information might well also be of value for use in design or in the improvement of existing designs.

Some agitation has existed concerning the standardization of ventilator tests. This would be a very desirable step forward. It would put ventilation problems on a sounder basis and eliminate to a certain extent the guesswork now existing.

The sheet metal worker can gain much from plenty of good, clean competition by the ventilator manufacturers, as this would in itself serve as advertising matter and would promote ventilation sales materially.

Side View of the Ventilator Shown Above

Would You Have Taken This Warm Air Heating Job at $350?

Dealer A Is Forced to Meet Dealer B's Price or Lose Job—What to Do?

By Furnace Salesman

THE following is a report of a furnace job just completed in a house 28 feet wide by 40 feet long, one side divided off with living room, dining room, and kitchen, the other side with two bedrooms and a bathroom, also three bedrooms on the second floor.

I believe furnace dealers, by keeping a record of the exact cost of completed jobs and comparing them with other dealers either at their meetings or through your paper, could help one another.

No dealer wants to take a contract for a furnace at a price that will not pay for his labor, material and overhead expense, but it is often done to meet a reported competitor's price, or a mistake made in the estimate.

I have known where a salesman representing a large volume dealer would report back to the sales manager that someone else was figuring the job, but he could get it if he was permitted to lower his price, say fifteen or twenty dollars. While this should not be done, yet very often, particularly if the company was not rushed with orders, he would be told to go out and get the order at the reduced price.

On the job mentioned above there was an 11x13 O. C. baseboard register placed in living room, a 10x12 O. C. baseboard register in dining room, kitchen and each of the two bed rooms on first floor and a 9x12 W. J. baseboard register in the bathroom. To heat the second floor three 3½x12 wall pipe were erected complete with three black japan sidewall registers.

The job included a 29-inch boiler-plate, brick-lined furnace, a separate run of warm air pipe used to connect each register or wall pipe to the furnace, making nine runs of warm air pipe in the cellar.

Three oak wood faces were placed on the first floor, one in living room, one in dining room and one in hall near stairway, these faces were connected to the furnace with three separate cold air ducts.

On this particular job things run rather smoothly in that there was no mistakes made in sending out the material and the men erecting the job were not delayed. The basement floor was cemented prior to erecting the furnace, and all necessary cutting to receive the pipes, boxes and register faces was done by the carpenter contractor without delay and where directed by the furnace man.

The location of the chimney was such that the furnace was erected almost in the center of the house, another good help to the furnace dealer.

Material used: 30 feet 3½x12 single wall pipe; four wall pipe elbows; three 3½x12 straight boots; three 9x12 single heads.

One straight boot for 11x13 register; one angle boot for 10x12 register; three straight boots for 10x12 registers; one straight boot for 9x 12 register; one 11x13 baseboard box; four 10x12 baseboard boxes; one 9x12 baseboard box.

One 11x13 O. C. base register; four 10x12 O. C. base registers; one 9x12 white Japan base register; three 9x12 black Japan sidewall registers.

Five feet 12 inches warm air pipe; forty feet 10-inch warm air pipe; thirty feet 9 inch warm air pipe, total number of feet of the different size pipe 75 or an average of eight feet for each run.

Two 12 inch, four 10 inch, four 9 inch elbows; four 10 inch angles; two 9 inch angles; one 12 inch; four 10 inch and four 9 inch collars and dampers.

One 20 inch boiler-plate, brick-lined furnace, casing and five feet 10 inch, 24-gauge galvanized smoke pipe, twelve pounds paper, two pounds paste, one pound wire, sand and cement.

The cold air ducts consisted of one 16 inch and two 20 inch separate ducts as follows: one 10x30 wood face; one pan 3 inches deep, 30 inches wide, 30 inches long; two 16 inch collars; four feet 16 inch round pipe; two 16 inch angles; one 16 inch draw band; one cold air stub for 16 inch pipe.

Two 20x30 wood faces; one pan 5 inches deep, 46 inches wide, 6 feet long; one box 13 inches deep, 30 inches wide, 5 feet long; four 20 inch collars; 10 feet 20 inch pipe; two 20 inch angles; two 20 inch draw bands, two cold air stubs for a 20 inch pipe.

The average length to the pan or box for the three cold air ducts was less than 5 feet.

It required the following labor to erect this job: four hours mechanic and helper to erect the wall pipe, place boxes and boots; fourteen hours mechanic and helper to erect furnace and warm air pipe and place the registers; twelve hours mechanic and helper to erect the cold air ducts and complete the job. A total of thirty hours for the mechanic and thirty hours for the helper erecting.

The following is what the dealer figures the job cost him to complete:

Furnace, casing, paper, paste, wire, sand cement and smoke pipe	$135.00
Wall pipe, registers and warm air pipe	67.51
Three cold air ducts made up and delivered	24.00
Labor to erect all material	55.00
Cost of labor and material without overhead or profit	$281.51

The above is a job where dealer

A was informed that dealer B, A's competitor, had submitted a figure of $350.00, but the owner preferred dealer A, and informed him that if he cared to do the job at $350, he could go ahead.

I do not encourage any dealer to accept business in this manner, but I do believe that when competition is real keen it is a very good idea to know pretty close what a job is going to cost before you enter the order.

Had this been a strictly Standard Code job, the cost would have run a little higher. As it was he was surprised it did not run higher, particularly the cold air ducts, on which the cost was reduced by the dealer having his own way in regard to placing the faces so as to shorten up the ducts.

This dealer says he would do another job at the same price, because the dealer quoting the price is supposed to be making money. He believes his actual overhead is smaller than his competitor's and he gets most of the labor cost and enough of the overhead to pay him a pretty fair salary. On new work, unless his furnace is specified, it is hard to get his price.

He says: "If my competitor, who is reputed to be a good business man and a first-class salesman, quotes a price of $350.00, using a similar type furnace, why can't I do the same thing?"

"I have been thinking that on new house work I will make up a price list of what my furnace would cost me in large quantities, registers, pipe and fittings at large quantity prices, use my actual costs on labor and add overhead and profit, and see if I can't get more new house work. What do you think"? Would my low overhead and doing my own work make up the difference in actual cost and give me a fair profit? I might be able to sell enough jobs this way to get the extra discount."

Does any other dealer, manufacturer, or the Better Business Committee of the National Warm Air Heating Association care to answer these questions?

Metaphragm Regulator a Device Which Controls Furnace Without Thermostat

The National Regulator Company, 2301 Knox Avenue, Chicago, Illinois, manufacturers of the National Metaphragm warm air furnace regulator, have recently produced some very attractive literature descriptive of the regulator for the furnace installer's use.

The Metaphragm regulator is a device which is installed in the warm air ducts of the heating system. It is a self-contained unit that does away with room thermostats. It has no motors, no wiring, no batteries, and puts service troubles at the absolute minimum.

The principle of operation is very simple. Six drums or compressors containing a liquid that is very sensitive to temperature changes, produce the motive power which operates the draft controls. These compressors expand or contract when the heat increases or decreases, operating the changes which either open or close the draft as the need of the room temperature above changes.

The device is very easily installed. Its action is positive and inevitable, and the cost is much less than the electrically operated heat regulators, because, of course, it does not need the amount of equipment necessary to operate the thermostatically controlled regulators.

The National Regulator Company is at the present time in a position to make an attractive offer to responsible warm air furnace installers for the agency of the Metaphragm regulator. It will pay you, therefore, to get in touch with them at once, asking for their proposition. Good profit awaits you.

What Is the Best Way to Clean a Chimney?

Fred Koch, Rogers City, Mich., is seeking the best method of cleaning a chimney, either by hand or with a machine.

He says: "It seems that everyone has a different way of doing it."

Jack Sauer Says a Word About Al Mayers Furnace Job

I have been following the problem submitted by Al Mayers of Pekin, Illinois, and the latest one causes me to send an answer along.

I am very much disappointed to learn that we still have some salesmen as they call themselves, who think so little of the furnaces they are selling as to make public announcement that it makes no difference to them or the firm they work for how a furnace is installed, just selling the furnace. That attitude has contributed more than any other one thing to slow up the progress of the warm air heating industry, in spite of all that the National Warm Air Heating Association has done to increase the sale of warm air heating equipment. It is discouraging that we should still find a man or a firm that will allow their products to be sold in the way stated.

Quality furnaces are sold by quality dealers who are strictly Standard Code installers and they get the cream of the business in their respective localities.

My advice to the man that expressed his views of how furnaces should be sold in that issue of AMERICAN ARTISAN had better learn salesmanship on Standard Code installations. He had better join the Travellers' Auxiliary to the Sheet Metal Contractors Association of Illinois and get acquainted with a bunch of real salesmen.

Jack Sauer
Meyer Furnace Company

Joseph T. Ryerson & Son, Inc., to Carry Millers Falls Electric Tools

Joseph T. Ryerson & Son, Inc., Chicago, have taken on the Millers Falls line of portable electric tools. This is a particularly fortunate arrangement for the Millers Falls Company of Millers Falls, Mass., as the Ryerson company have handled high-grade electric tools for years and their judgment and sales ability is particularly good in this field.

Greater Chicago Warm Air Heating Men Hold Regular Meeting

The Greater Chicago Warm Air Heating Association held its regular semi-monthly meeting on Monday evening, November 12, 1928. In accordance with the plan adopted previously by the association, the meeting took the form of a dinner paid for by the association. The dinner was held in a private room at the quarters of the Cook County Democracy Club on the boat docked at the foot of Franklin street and Wacker drive.

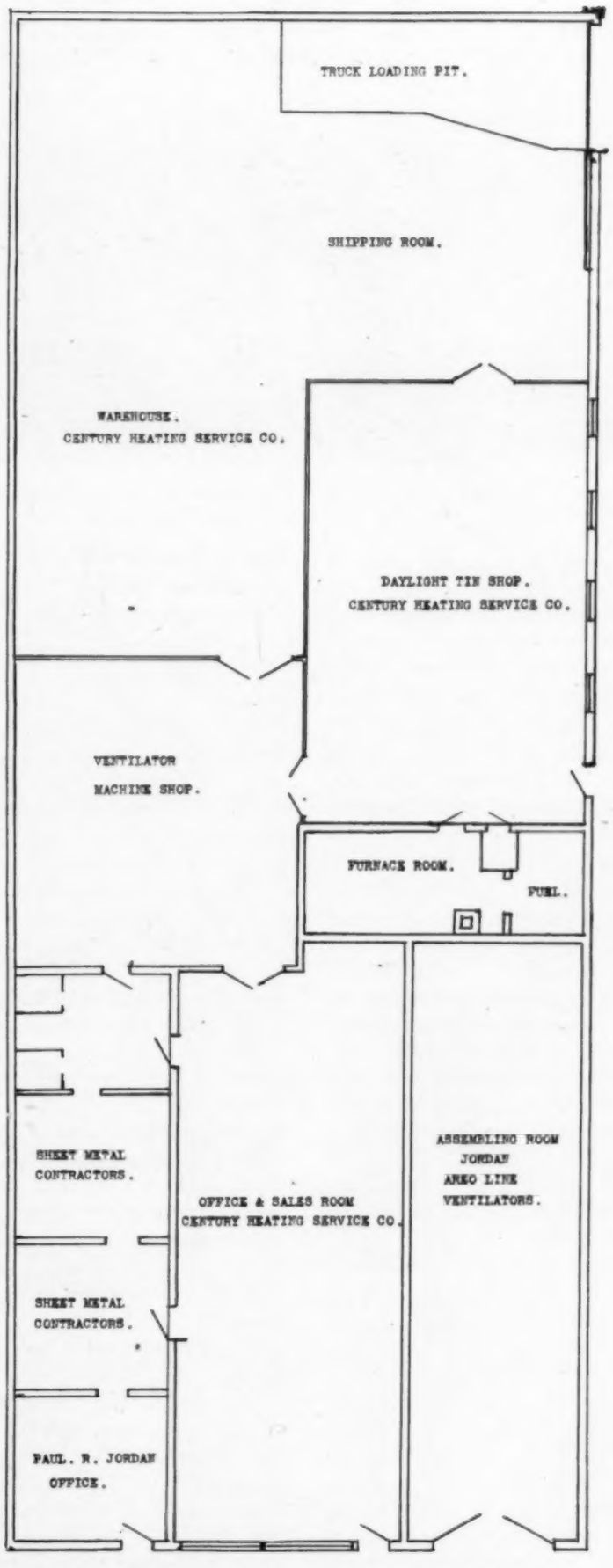
Following the dinner, President L. M. Burt called the meeting to order, during which a discussion was entered into on ways and means of increasing the services of the association to its members. R. H. Guenther of the Accurate Sheet Metal Works proposed that the association take up the matter of cooperative advertising, with the object in view to educate the Chicago public into a better understanding and appreciation of the merits of warm air heating.

A committee of three, consisting of President L. M. Burt, R. H. Guenther and George Duerr, was appointed to investigate the costs of cooperative advertising in certain of the city's daily newspapers, and this committee will be ready to report at the next meeting, when a plan will be determined upon.

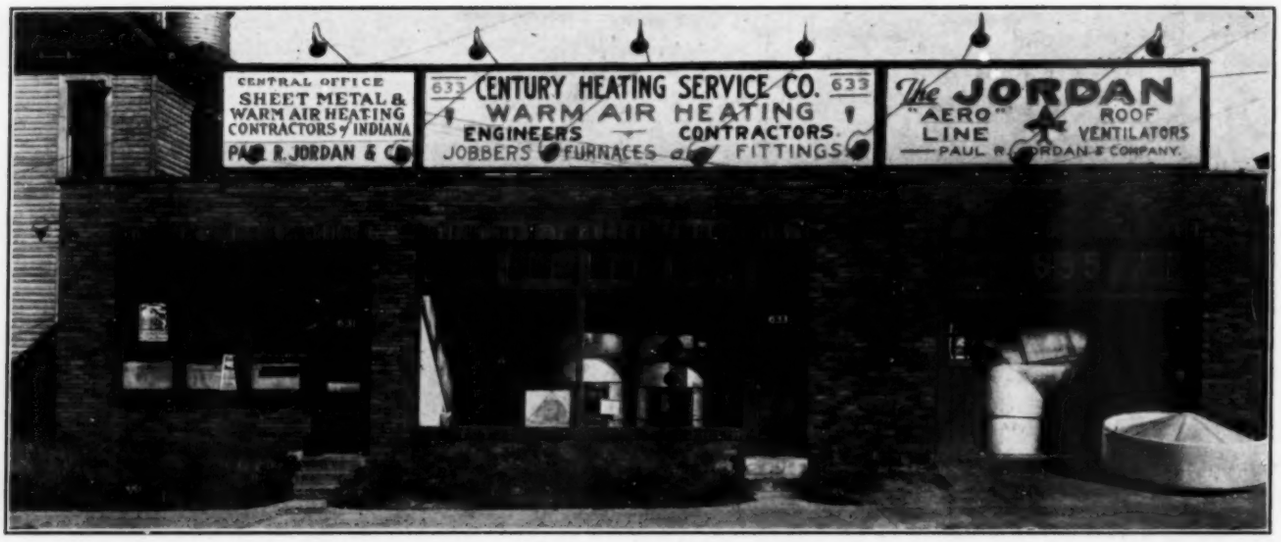
Century Heating Service Company Believes in Advertising

Many sheet metal and warm air heating contractors pay little or no attention to letting people know they are in business. It is not that they do not think well enough of their businesses, but it is merely that they do not take the time to view the business and the place in which it is housed through the eyes of the man on the street.

The accompanying illustration gives a good idea of what the Century Heating Service Company, 633 South Delaware Street, Indianapolis, Indiana, has done in this respect. Attention is called to the fact, in connection with the Century



First Floor Plan of the Paul R. Jordan Building



Large Sign on the Top of the Paul R. Jordan Building Which Informs the Public of the Nature of the Business Carried on Within. It Must Pay Them to Do This or They Wouldn't Do It

Heating Service Company, that in the October 6th issue of AMERICAN ARTISAN it was stated that this company had recently changed its location. In making this fact known, however, an error was made in the name. The name was inadvertently given as the XXth Century Heating & Ventilating Company, instead of the Century Heating Service Company which it should have been.

It is the Century Heating Service Company that is now located at 633 South Delaware Street, Indianapolis, and not the XXth Century Heating & Ventilating Company.

The Century Heating Service Company is housed in the same building in which the Paul R. Jordan Company is located. The general offices of the Sheet Metal & Warm Air Heating Contractors of Indiana, of which Mr. Jordan is the executive secretary, are also housed in this building.

A general floor plan of this building is also given herewith, showing how conveniently everything is laid out for the greatest possible efficiency. Full advantage is taken of every possible opportunity of making window displays. The attention of the public is called to the nature of the work which goes on within by means of the big sign over the front entrances. This sign is equipped with an adequate lighting system which illuminates it at night.

Fred R. Dowsett Now V. P. and General Manager of the Beckwith Company

John A. Howard, general manager of the Beckwith Company, makers of the Round Oak warm air furnace, Dowagiac, Michigan, has resigned his position with that company. In addition he has disposed of all his Dowagiac interests, including his home, and will move to Kalamazoo, Michigan.

Mr. Howard has been with the Beckwith company for many years. He started as a traveling salesman and worked his way up, becoming sales manager, and had entire charge of the distribution of the company's product.

During the time he was sales manager the company's sales so enlarged that the plant was more than doubled in size. About a year ago he was chosen as general manager and continued in that capacity until a short time ago, when he was succeeded by F. R. Dowsett, who is now the vice-president and general manager.

When the business was incorporated, Mr. Howard became one of the stockholders and a director of the company. Later he was elected vice-president and then vice-president and general manager. Last week Mr. Howard sold his entire holdings in the Beckwith company, amounting to nine hundred shares. The company was the purchaser, and it is understood that some of the employes may be given an opportunity to buy some of this stock.

Mr. Howard states that he has not decided in what line he will engage, but he is looking for a favorable opportunity. There has been a rumor that he might start another stove and furnace company.

George A. Cooper New Member of Staff of the Division of Simplified Practice

Mr. George A. Cooper of the Monongahela West Penn Public Service Company, Fairmont, West Virginia, has been appointed as an Assistant Chief Business Specialist in the Division of Simplified Practice of the Bureau of Standards, United States Department of Commerce, according to Mr. Ray M. Hudson, Assistant Director in charge of Commercial Standards Group of the Bureau.

Prior to coming with the Division of Simplified Practice, Mr. Cooper was Superintendent of Materials of the Monongahela West Penn Public Service Company. He has had considerable experience in the actual application of simplified practice within a company, inasmuch as his concern reduced their financial investment in inventory by 33 per cent and eliminated 16 per cent of the items carried in stock through simplification.

WHO'S WHO, WHERE!

PINE BLUFF, ARK.—Robinson Bros. has the contract for ventilating systems in Dixon Hall at H. Sophie Newcomb College in New Orleans, La.

LOS ANGELES, CAL.—The Hodge Sheet Metal Works has the sheet metal contract for Hollywood Central Building Co. bank building.

Morris Donato has engaged in business at 3064 West Pico street as Master Unit Furnace Co.

SAN FRANCISCO, CAL.—The Moresi Tinning Co. has engaged in business at 2288 Third street.

The Guilfoy Cornice Works, 1234 Howard street, has been awarded the sheet metal work contract for Record Printing & Publishing Co. building.

Gunn, Carle & Co., 444 Market street, have the steel rolling door contract for $1,500,000 Sears, Roebuck & Co. building.

The U. S. Metal Products Co., 330 Tenth street, has the metal sash and fire door contract for business building of the Oakland California Towel Co., Oakland, Cal.

STOCKTON, CAL.—R. E. Fraser, 433 South San Joaquin street, has the sheet metal and waterproofing contract and Chas. Christensen, 77 O'Farrell street, San Francisco, the rolling door contract for group of buildings of Fast Bay Public Utilities Co. in Stockton.

SIOUX CITY, IA.—Larson Brothers, 216 Sixth street, have the warm air heating contract for residence of Leo Kucinsky.

MANHATTAN, KAS.—The Manhattan Sheet Metal Co. has been awarded the sheet metal contract for Manhattan Country Club.

SHREVEPORT, LA.—The Houseman Sheet Metal Works, Inc., has been chartered with a capital of $25,000 by G. A. Houseman and others.

WYANDOTTE, MICH.—The Gartner Service Co. has been incorporated at 2909 Van Alstyne boulevard, to handle stoves and other heating apparatus.

DULUTH, MINN.—T. H. Otterson, 2229 W. Superior, has the warm air heating contract for residence of Skafte Realty Co.

JERSEY CITY, N. J.—The Liberty Auto Radiator Co., 3218 Hudson boulevard, is soon to erect $40,000 repair shop.

PORTLAND, ORE.—The Mallett Sheet Metal Shop, 1635 East 17th street, has the sheet metal contract for residence of R. St. James.

The Levin Furnace Co., 525 East Broadway, has the warm air heating contract, and Campbell-Hensley Sheet Metal Works, 907 Alberta, the sheet metal contract for residence of M. S. Hulbert, and also for residence of Albin-Oscarson.

NORFOLK, VA.—The A. C. Dyer Co., 318 W. 24th St., has been awarded the roofing, sheet metal and waterproofing contract for $300,000 Infantry Battalion Barracks, at Fort Leonard Woods, Md.

SEATTLE, WASH.—The Builders Sheet Metal Works, 1716 Yale street, has the sheet metal and roofing contract, and Truscon Steel Co., Seaboard Building, Seattle, the steel sash contract, for factory of Red Rock Creamery Co., in Kent, Wash.

EAU CLAIRE, WIS.—The Hovland Sheet Metal Works, has the heating contract for four residences of John Ranes.

CHIPPEWA FALLS, WIS.—Henry McAleer has been awarded the furnace heating contract for residence of Clarence Nicolai.

Lee Coller Operated on for Appendicitis At Dowagiac, Mich.

Lee Coller of the Dowagiac Steel Furnace Company, Dowagiac, Mich., is at the present time in the Lee Sanitarium, Dowagiac, convalescing from an operation for appendicitis which he underwent recently, according to R. S. McNaney, president of the Dowagiac Steel Furnace Company.

Simplification for Eaves Trough and Conductor Pipe Reaffirmed by Industry Without Change

Simplified Practice Recommendation No. 29, Eaves Trough and Conductor Pipe, has been reaffirmed by the standing committee, without change, for another year, it has just been announced by the Division of Simplified Practice.

A survey conducted prior to the revision meeting indicated that 94 per cent of the annual production of this commodity is in conformity with the simplified schedule. This simplified practice recommendation, as originally adopted by industry, reduced the varieties of the commodity from 21 to 16.

National Warm Air Heating Association, Hotel Statler, Buffalo, New York, December 4 and 5, 1928. Secretary, Allen W. Williams, 174 East Long Street, Columbus, Ohio.

Indiana Sheet Metal and Warm Air Heating Contractors' Association, Indianapolis, Indiana, January 22, 23, 24, 1929. Executive Secretary, Paul R. Jordan, 631 South Delaware Street, Indianapolis.

Ohio Sheet Metal Contractors' Association, Columbus, Ohio, February 12, 13, 14, 1929. Arthur P. Lamneck, W. E. Lamneck Company, Columbus, Ohio, Chairman convention committee.

Michigan Sheet Metal & Roofing Contractors' Association, Flint, Michigan, March 5, 6, 7, 1929. Frank Ederle, 1121 Franklin Street, S. E., Grand Rapids, Michigan, Secretary.

"May" Oil Burners

From Pease Heating & Plumbing Company, Redwood Falls, Minnesota.

Can you tell me who makes the "May" oil burners for furnaces?

Ans.: May Oil Burner Corporation, Baltimore, Maryland.

"Reed" Air Filter

From J. Kefferly Sheet Metal Works, 4320 Armitage Avenue, Chicago.

Please tell us who makes the "Reed" Air Filter.

Ans.: Reed Air Filter Company, Louisville, Kentucky.

"Mogul Warm Air Furnace

From Benke Furnace and Tinning Company, 112 Public Square, Stevens Point, Wisconsin.

Will you kindly inform us who makes the "Mogul" warm air furnace?

Ans.: Portsmouth Stove and Range Company, Portsmouth, Ohio.

Asbestos Furnace Paint

From Ideal Furnace Company, 2995 East Grand Boulevard, Detroit, Michigan.

Can you tell us who manufactures Asbestos Furnace Paint in colors? The material referred to was advertised in a recent issue of AMERICAN ARTISAN.

Ans.: The Band F. Mfg. Co., 422 Court Avenue, Des Moines, Iowa.

"Burritt's Roofing Tongs

From The Behler-Young Company, Grand Rapids, Michigan.

Please tell us who manufactures "Burritt's" Roofing Tongs.

Ans.: O. W. Burritt and Brother, Weedsport, New York.

Who Makes "Bell's" Double Edgers?

TO AMERICAN ARTISAN:

Can you tell us who makes Bell's Double Edgers? This is a machine which tin roofers use to turn up edge on each side of the tin. We need several parts to replace some broken attachments.

Yours very truly,

THE CONNER MANUFACTURING COMPANY, Louisville, Kentucky.

Wisconsin Sheet Metal Men Prepare for Annual Convention

The Master Sheet Metal Contractors' Association of Wisconsin met in Milwaukee. The meeting was called to order, with President Tolg in the chair and the following members present: Louis Reinke, August Zindars, R. Jeske, Otto Geussenhainer, Paul Biersach, Alfred Goethel, W. Gehrke, Henry Geussenhainer, Walter Belau.

Minutes of the previous meeting were read and approved.

Monthly reports from the National Association of Sheet Metal Contractors and the National Sheet Metal Contractor were read and ordered placed on file.

Mr. Goethel mentioned that he has a record of 42 subscriptions to the Encyclopedia and the secretary stated that another letter would be sent to all sheet metal men urging them to send in their subscriptions now. A list of subscriptions on hand will be enclosed with this letter.

Motion was made and carried that the bill for flowers the association sent to the funeral of H. J. Dettmer, Chicago, be paid.

A general discussion followed in reference to the coming convention and it was suggested that the secretary write C. J. Jacobs of Stevens Point to get information relative to the date of the Hardware Convention. Mr. Tolg stated that he will appoint a convention committee immediately.

New Product in Field Automatic Draft Control

Field Automatic Draft Control and Cleanout is the title of a 4-page folder by the Field Manufacturing Company, 1319 West Lake Street, Chicago.

As described, this control consists of a rectangular plate with an arm holding a movable counterbalance on one edge. The purpose of the control is to maintain an even draft in the chimney, regardless of such variable conditions as are encountered on windy days, in foggy weather and with irregular firing.

When this control is placed in an opening in the chimney the plate is drawn inwards as the draft increases, because of wind or other reasons, thus enlarging the opening and automatically decreasing the draft. As the draft decreases the plate swings shut and consequently, by closing the opening, increases the draft.

Adjustment to the draft, which is to be maintained, is made by moving the counterbalance to the correct position at the time the control is installed. By preventing too much excess air because of too great draft and by allowing the combustible gases to be burned more completely by reducing the draft when the draft is too high, the control is said to effect an appreciable saving in fuel.

Standard sizes of these controls are 8, 12, 16, 20 and 24 in., while larger sizes are made to order. An 8-inch control is used for an 8-inch by 8-inch stack, while for an 8-inch by 12-inch stack a 12-inch control would be selected.

WELDING COPPER

(*Concluded from Page 92*)

much oxide for satisfactory welding. If it does not break, high-strength welds will be obtainable.

Where deoxidized copper and welding rods are used, the welding technique is quite similar to that employed for steel.

TABLE 1—TESTS OF WELDS IN COPPER

Material	Ultimate Strength, lb. per sq. in.	Elongation in 2 in., per cent
Welds in ordinary copper plate containing 0.01 to 0.08 per cent oxygen*	15,520	8
Welds in deoxidized copper plate**	26,250	23
Original deoxidized copper plate	32,000	45

*Break a small fraction of an inch from the weld.

**Break in weld.

Because of the high heat conductivity of copper, the tip or welding head should be one or two sizes larger than that used for steel of the same thickness. Covering the work with asbestos paper will also help to prevent loss of heat. Large sections should always be preheated to a dull red, and small parts whenever possible.

No flux of any sort is needed. Copper melts at a relatively low temperature and the molten copper flows more readily than steel; the welder will quickly note these minor differences and modify his manipulations accordingly.

The important point in obtaining high-strength welds in copper is to start with completely deoxidized metal and welding rod. This makes possible good results.

Arc Welding Is Subject of Lecture Tour

A lecture tour covering a large part of the United States is being made by Professor Frank P. McKibben, well-known consulting structural and bridge engineer, who is associated with the General Electric Company, Schenectady, N. Y. The tour will comprise a series of lectures made in response to invitations from various societies throughout the country, on the application of electric arc welding to the construction of buildings, based on the experiences of the General Electric Company and other engineers in this field.

The schedule of Professor McKibben's appearances is not complete as yet, but among the cities which he will visit are: Philadelphia, Providence, R. I.; Pittsburgh, Baltimore, Columbus, O.; Chicago, Des Moines; St. Louis, Kansas City, Mo.; Denver, Los Angeles, San Francisco, Seattle, Birmingham, Ala., and Atlanta, Ga.

The talk takes about one hour for delivery, and a discussion of one or two hours usually follows. The speaker started his itinerary October 4 and expects to finish about March 4.

Western Style Extension Ladders

REG. IN U.S. PAT. OFF.
HARTFORD
12 Oz.
29 Inch
STANDARD
DUCK
MADE IN U.S.A.

REG. IN U.S. PAT. OFF.
SELKIRK
12-Oz.
EXTRA DUCK
DOUBLE FILLING
MADE IN U.S.A.
(29 In.)

REG. IN U.S. PAT. OFF.
MT. VERNON
EXTRA
COTTON DUCK
100 Yds. No 6
36 Inch
MADE IN U.S.A.

CANVAS AND CANVAS PAINT

Osborn's Gray Canvas Paint is made especially for painting canvas on porch roofs, decks, etc.

Plain or Barbed Steel or Copper

Roofing and Slating Nails

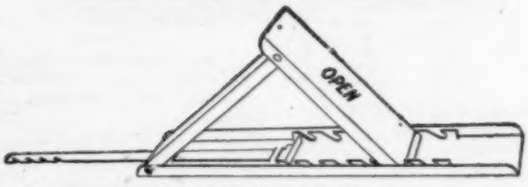
LARGE HEAD

PROMINENT ITEMS IN OUR

ROOFERS SUPPLY STOCK

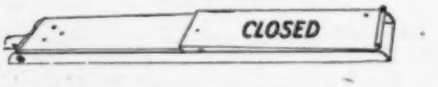
THE J. M. & L. A.
OSBORN Co
CLEVELAND-BUFFALO
"Everything Used in Sheet Metal Work"

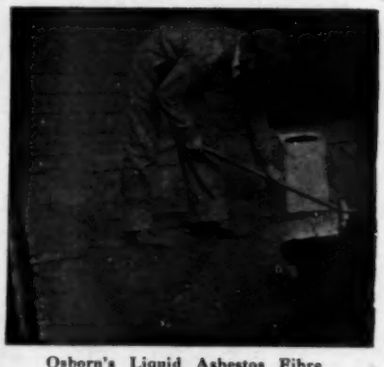
Sipe's Japan Oil



"Ajax" Roof Brackets

Safety Ladder Jacks





Osborn's Liquid Asbestos Fibre Roofing Cement

Slaters' Rippers

Slaters' Stakes

Slaters' Hammers

Osborn's Black Elastic Roofing Cement

Chicago Warehouse Metal and Furnace Supply Prices

AMERICAN ARTISAN is the only publication containing Western Metal, Furnace Supply and Hardware prices corrected weekly

METALS

PIG IRON

Chicago Fdy., No. 2	$19 50
Southern Fdy. No. 2	22 26
Lake Superior Charcoal	27 04
Malleable	19 50

FIRST QUALITY BRIGHT TIN PLATES

IC	20x28 112 sheets	$26 40
IX	20x28	30 90
IXX	20x28 56 sheets	16 85
IXXX	20x28	18 20
IXXXX	20x28	20 20

TERNE PLATES

		Per Box
IC	20x28, 40-lb. 112 sheets	$26 70
IX	20x28, 40-lb. 112 sheets	29 70
IC	20x28, 25-lb. 112 sheets	22 20
IX	20x28, 25-lb. 112 sheets	25 20
IC	20x28, 20-lb. 112 sheets	20 25
IV	20x28, 20-lb. 112 sheets	23 00

"ARMCO" INGOT IRON PLATES

No. 8 ga. up to and including ¼ in.—100 lbs. $4 55

COKE PLATES

Cokes, 80 lbs., base, 20x28	$12 60
Cokes, 90 lbs., base, 20x28	13 80
Cokes, 100 lbs., base, 20x28	14 00
Cokes, 107 lbs., base, IC 20x28	14 30
Cokes, 135 lbs., base, IX 20x28	16 30
Cokes, 155 lbs., base, 56 sheets	9 00
Cokes, 175 lbs., base 56 sheets	9 85
Cokes, 195 lbs., base, 56 sheets	10 70

BLUE ANNEALED SHEETS

Base 10 ga. per 100 lbs.	$3 35
"Armco" 10 ga. per 100 lbs.	4 00

ONE PASS COLD ROLLED BLACK

No. 18-20 per 100 lbs.	$3 60
No. 22 per 100 lbs.	3 75
No. 24 per 100 lbs.	3 80
No. 26 per 100 lbs.	3 90
No. 27 per 100 lbs.	3 95
No. 28 per 100 lbs.	4 05
No. 29 per 100 lbs.	4 20
No. 30 per 100 lbs.	4 30

"ARMCO" GALVANIZED

"Armco" 24 per 100 lbs. $6 15

GALVANIZED

No. 16 per 100 lbs.	$4 15
No. 18 per 100 lbs.	4 30
No. 20 per 100 lbs.	4 45
No. 22 per 100 lbs.	4 50
No. 24 per 100 lbs.	4 65
No. 26 per 100 lbs.	4 90
No. 27 per 100 lbs.	5 00
No. 28 per 100 lbs.	5 15
No. 30 per 100 lbs.	5 55

BAR SOLDER

Warranted

50-50 ..... per 100 lbs. $32 75

Commercial

45-55	per 100 lbs.	29 25
Plumbers	per 100 lbs.	26 25

ZINC

In Slabs ..... $ 7.25

SHEET ZINC

Cask Lots (600 lbs.)	$11 25
Sheet Lots	12 25

BRASS

Sheets, Chicago Base	21½c
Mill base	20½c
Tubing, brazed base	29½c
Wire, base	21¾c
Rods, base	19¼c

COPPER

Sheets, Chicago base	25c
Mill base	24c
Tubing, seamless base	27½c
heavier	29¾c
Wire, No. 9, B & S Ga.	21¼c
Wire, No. 10, B & S Ga.	21¼c
Wire, No. 11, B & G Ga.	21¼c

LEAD

American Pig	$7 50
Bar	8 50

TIN

Pig Tin per 100 lbs.	$58 00
Bar Tin per 100 lbs.	59 00

HARDWARE, SHEET METAL SUPPLIES, WARM AIR FURNACE FITTINGS AND ACCESSORIES.

ASBESTOS

Paper up to 1/16	6c per lb.
Roll board	6¼c per lb.
Mill board 3/32 to ⅛	6c per lb.
Corrugated Paper (250 sq. ft. to roll)	$6 00 per roll

BRUSHES

Furnace Pipe Cleaning

Bristle, with handle, each $0 75

Flue Cleaning

Steel only, each 1 25

CEMENT, FURNACE

American Seal, .5-lb. cans, net	$ 45
American Seal, 10-lb. cans, net	85
American Seal, 25-lb. cans, net	2 25
Pecora ..... per 100 lbs.	7 50

CHIMNEY TOPS

Adams' Revolving	Wt. Doz.	Price Doz.
4 in.	21 lbs.	$11 00
6 in.	24 lbs.	11 50
7 in.	30 lbs.	13 50
8 in.	33 lbs.	15 00
9 in.	51 lbs.	16 50
10 in.	56 lbs.	18 00
12 in.	66 lbs.	22 00
14 in.	110 lbs.	36 00

CLINKER TONGS

Each $1 50

CLIPS

Damper

No-Rivet Steel, with tail pieces, per gross	$9 50
Rivet Steel, with tail pieces, per gross	7 50
Tail pieces, per gross	3 40

COPPERS—Soldering

Pointed Roofing

3 lb. and heavier per lb.	40c
2½ lb. per lb.	45c
2 lb. per lb.	48c
1½ lb. per lb.	55c
1 lb. per lb.	60c

CORNICE BRAKES

Chicago Steel Bending

Nos. 1 to 6B ..... Net

CUT-OFFS

Gal., plain, round or cor. rd.

26 gauge	30%
28 gauge	35%

DAMPERS

"Yankee" Hot Air

7 inch, each 20c, doz.	$1 60
8 inch, each 25c, doz.	2 20
9 inch, each 30c, doz.	2 60
10 inch, each 32c, doz.	2 80

Smoke Pipe

7 inch, doz.	$1 60
8 inch, doz.	2 20
9 inch, doz.	2 60
10 inch, doz.	2 75
12 inch, doz.	4 50

ADAMS No. 1 CHECK

Check and Collar Complete

8 inch, each	2 00
9 inch, each	2 25

End Check Only

8 inch, each	1 60
9 inch, each	1 85

Collar Only

8 inch, each	50
9 inch, each	65

No. 2 CHECK

8 inch, each	1 60
9 inch, each	1 80

10% Disc. on Adams No. 1 and No. 2 Check

Diamond Smoke Pipe

7 inch, doz.	$ 2 00
8 inch, doz.	2 20
9 inch, doz.	4 **
10 inch, doz.	6 00

Adams' Sheet Metal

7 inch, doz.	$ 1 60
8 inch, doz.	2 20
9 inch, doz.	2 60
10 inch, doz.	2 80
12 inch, doz.	3 50
14 inch, doz.	5 00

EAVES TROUGH

Galv. Crimpedge, crated 75 &	10%
Zinc, "Barnes"	60%

ELBOWS

Conductor Pipe

Galv. plain or corrugated, round flat Crimp.

28 Gauge	60%
26 Gauge	45%
24 Gauge	15%

Galv. & Terne Steel

Plain Rd. and Rd. Corr.:

28 Ga.	60%
26 Ga.	45%
24 Ga.	15%

Square Corrugated

No. 28 Gauge	50%
26 Gauge	35%

Portico Elbows

Standard Gauge Conductor Pipe plain or corrugated.

Not nested	70 & 5%
Nested Solid	70 & 5%

Sq. Corr., A. & B. & Octagon

28 Ga.	50%
26 Ga.	35%

Portico

1", 1¼", 1½"	45%

Copper

16 oz., all designs 50%

Zinc—

All styles 60%

ELBOWS—Stove Pipe

1-piece Corrugated, Uniform Blue "Milcor" No. 28 Gauge. Doz.

5-inch	$1 05
6-inch	1 20
7-inch	1 75

Special Corrugated

6-inch	$1 00
7-inch	1 60

Adjustable—Uniform Blue

"Milcor" No. 28 Gauge. Uniform Blue.

5-inch	$1 65
6-inch	1 75
7-inch	2 10

WOOD FACES—50% off list.

FENCE

726-6-12½% (100 rods)	$23 68
1948-6-14½% (100 rods)	42 62

FILES AND RASPS

Heller's (American)	50-10%
American	60-10%
Arcade	50%
Black Diamond	50%
Eagle	50%
Great Western	50%
Kearney & Foot	50%
McClellan	50%
Nicholson	50%
Simonds	60%

FIRE POTS

Geo. W. Diener Mfg. Co. Ea.

No. 02 Gasoline Torch, 1 qt.	$ 5 12
No. 0250, Kerosene, or Gasoline Torch, 1 qt.	6 50
No. 10 Tinner's Furn. Square tank, 1 gal.	11 20
No. 15 Tinner's Furn. Round tank, 1 gal.	10 70
No. 21 Gas Soldering Furnace	5.60
No. 110 Automatic Gas Soldering Furnace	10 50

Quick Meal Stove Co.

Vesuvius, F. O. B. St. Louis 30%
(Extra Disct. for large quantities.)

GALVANIZED WARE

Pails (Galv. after made), 10-qt.	$2 00
Tubs (Galv. after made).	
No. 1	5 75
No. 2	6 50

GLASS

Single Strength, A, all brackets	87%
Single Strength, B, all brackets	88-5%
Double Strength, A, all brackets	87%
Double Strength, B, all brackets	88-5%

HANGERS

Conductor Pipe

Milcor Perfection Wire	25%
Milcor Triplex Wire	10%

Eaves Trough

Milcor Steel (galv. after forming) List	plus 12½%
Milcor Sellock E. T. Wire, List	plus 50%

HOOKS

Conductor

"Direct Drive" Wrought Iron for wood or brick..15%

HUMIDIFIER

"Front-Bank," Automatic

In single lots	50%
In lots of 10 or more	50-5%
In lots of 25 or more	50-10%
Vapor pans, etc., each	50%

LIFTERS

Stove Cover

Coppered ..... per gro.	$6 00
Alaska ..... per gro.	4 75

MALLETS

Tinners

Hickory ..... per doz. $2 25

MITRES

Galvanized steel mitres.

28 Ga.	70
26 Ga.	60-20

NAILS

Cut Steel, base $4 00

Wire

Common	$3 10
Cement Coated	3 10

(Continued on Page 112)

"Who is *that* man?"

"I've seen him round several times recently. Who is he?" asked the general manager.

"I've told you about him. He's the Linde Service Operator," replied the master mechanic. "This morning he was working with our welders on repairing that big casting. I don't know what he's working on over there. Probably he's telling Tom some new welding wrinkle. Anyway, I'll bet it shows up as a saving of some kind in our costs."

WHEN a Linde customer needs help that he can't get from the Linde booklets and magazines or from special written instructions, then there is a Linde Service Operator. He is experienced in the latest and most economical oxy-acetylene technique. He is a part of Linde Process Service.

THE LINDE AIR PRODUCTS COMPANY
Unit of Union Carbide UCC *and Carbon Corporation*
General Offices: Carbide and Carbon Building
30 East 42d Street, New York
54 PLANTS · 98 WAREHOUSES

LINDE OXYGEN

Mention AMERICAN ARTISAN in your reply—Thank you!

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PASTE

Asbestos Dry Paste:
200-lb. Barrel $16 00
100-lb. barrel 8 75
35-lb. pail 3 50
10-lb. bag 1 10
5-lb. bag 60
2½-lb. cartons 25

POKERS, FURNACE

Each $0 75

POKERS, STOVE

Nickel Plated, coil handles, per doz. 1 10
W'r't Steel, str't or bent, per doz. $0 75

PIPE

Conductor
Cor. Rd., Plain Rd., or Sq.

Galvanized
Crated and nested (all gauges) 75-7½%
Crated and not nested (all gauges) 75-2½%

Furnace Pipe
Double Wall Pipe and Fittings 50%
Single Wall Pipe, Round Galvanized Pipe 50%
Galvanized and Tin Fittings 50%

Lead
Per 100 lbs. $12 50

Stove Pipe
"Milcor" "Titelock" Uniform Blue Stove
28 gauge, 6 inch U. C. nested 10 50
28 gauge, 6 inch U. C. nested 11 00
28 gauge, 7 inch U. C. nested 12 00
30 gauge, 5 inch U. C. nested 9 00
30 gauge, 6 inch U. C. nested 10 00
30 gauge, 7 inch U. C. nested 12 00

T-Joint Made up
6-inch, 28 ga....per doz. $ 4 00

All Zinc
No. 11, all styles.....40%

PULLEYS

Furnace Tackle....per doz. $0 85
.....per gro. 8 50
Furnace Screw (enameled) .....per doz. 75

PUTTY

Commercial Putty, 100-lb. Kits $3 50

QUADRANTS

Malleable Iron Damper.....10%

REDUCERS—Oval Stove Pipe

	Per Doz.
7—6, 28-gauge, 1 doz. in carton	$2 00

REGISTERS AND BORDERS

Baseboard, Floor and Wall.

Cast Iron 30%
Steel and Semi-Steel.....33⅓%
Baseboard, 1 piece... 40-20%
Baseboard, 2 piece.....33⅓%
Wall 33⅓%
Adjustable Ceiling Ventilators 40%

Register Faces—Cast and Steel
Japanned, Bronzed and Plated, 4x6 to 14x14.....33⅓%
Large Register Faces—Cast, 14x14 to 38x42.....60%
Large Register Faces—Steel, 14x14 to 38x42.....65%

Ventilating Register
Per gross 9 00
Small, per pair 30
Large, per pair 50

RIDGE ROLL

Galv., Plain Ridge Roll, b'did 75-15-5%
Galv., Plain Ridge Roll crated 75-15%
Globe Finials for Ridge Roll..50%

SCREWS

Sheet Metal
7, ⅛x⅛, per gross.....$0 53
No. 10, ¾x3/16, per gross 63
No. 14, ¾x¼, per gross.. 83

SHEARS, TINNERS' & MACHINISTS'

Viking $22 00

Lennox Throatless
No. 18 .....35%
Shear blades 10%
(f. o. b. Marshalltown, Iowa)

SHIELDS, ADJUSTABLE RADIATOR

No. 1 "Gem" 11" to 17".....30%
No. 2 "Gem" 14" to 24".....30%
No. 3 "Gem" 25" to 65".....30%

SHOES

Galv. 28 Gauge, Plain or corrugated round flat crimp...60%
26 gauge round flat crimp....45%
24 gauge round flat crimp....15%

SNIPS, TINNERS

Clover Leaf .....40 & 10%
National .....40 & 10%
Star 50%
Milcor .....Net

SQUARES

Steel and Iron .....Net
(Add for bluing $3 per doz. net)
Mitre .....Net
Try .....Net
Try and Bevel.....Net
Try and Mitre.....Net
Fox's .....per doz. $6 00
Winterbottom's 10%

STOPPERS, FLUE

Common .....per doz. $1 10
Gem, No. 1.....per doz. 1 10
Gem, flat, No. 3....per doz. 1 00

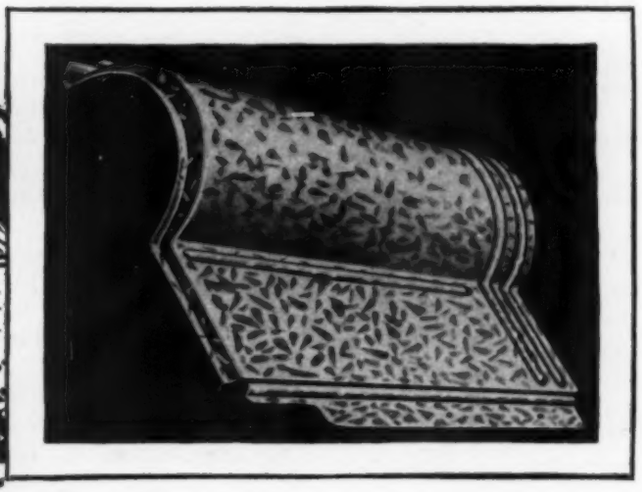
VENTILATORS

Standard .....30 to 40%

WIRE

Black annealed wire, No. 9, per 100 lbs. $3 30
Galvanized barb wire, per 100 lbs. 3 90
Cattle Wire—galvanized catch weight spool, per 100 lbs.. 3 80
Galvanized Plain Wire, No. 9, per 100 lbs. 3 85

GARAGES... *Make them attractive with beautiful* SPANISH METAL TILE



WHEELING SPANISH METAL TILE AND FITTINGS make a roof that is rust-proof, leak-proof, fire-proof, lightning-proof—and a thing of beauty, too! Low cost makes it the practical roof for garages as well as larger buildings.

If you have overlooked this source of profit, make no mistake *now.* Wheeling Spanish Metal Tile Roofs are suitable for practically every type of residence and building. Old roofs badly in need of repairs and at the mercy of storms or fires, can be replaced with Wheeling Spanish Metal Tile Roofs at low cost and each job nets you both profit and prestige.

For your business growth and profit opportunity use Wheeling Spanish Metal Tile and Fittings. The tiles are easy to lay—the fittings are easy to apply. And each unit is fabricated from Cop-R-Loy, the Copper Alloyed Steel, and guaranteed Hand Dipped in pure molten zinc.

WHEELING CORRUGATING COMPANY, Wheeling, W. Va.

New York Philadelphia Chicago Kansas City St. Louis Richmond
Chattanooga Minneapolis Des Moines Columbus, Ohio

Wheeling CORRUGATING COMPANY

Wheeling

Mention AMERICAN ARTISAN in your reply—Thank you!

BUYERS' DIRECTORY

Asbestos Liquid.
B. & F. Mfg. Co., Des Moines, Ia.

Acetylene (Gas) Dissolved.
Prest-O-Lite Co., Inc., New York, N. Y.

Bolts—Stove.
The Kirk-Latty Co., Cleveland, Ohio
Lamson & Sessions Co., Cleveland, Ohio
Ryerson & Son, Inc., Jos. T., Chicago, Ill.

Brakes—Bending.
Dreis & Krump Mfg. Co., Chicago, Ill.
Ryerson & Son, Inc., Jos. T., Chicago, Ill.

Brakes—Cornice.
Dreis & Krump Mfg. Co., Chicago, Ill.

Brass and Copper.
American Brass Co., Waterbury, Conn.
Copper & Brass Research Association, New York

Burners—Gas.
Wonder-Worker Gas Appliance Co., Cincinnati, Ohio

Cans—Garbage.
Osborn Co., The J. M. & L. A., Cleveland, Ohio

Castings—Malleable.
Fanner Mfg. Co., Cleveland, Ohio

Ceilings—Metal
Burton Co., The W. J., Detroit, Mich.
Friedley-Voshardt Co., Chicago, Ill.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
Wheeling Corrugating Co., Wheeling, W. Va.

Chaplets.
Fanner Mfg. Co., Cleveland, Ohio

Chimney Tops.
Standard Ventilator Co., Lewisburg, Pa.

Clinker Tongs.
L. J. Mueller Furnace Co., Milwaukee, Wis.
Stover Mfg. & Engine Co., Freeport, Ill.
Wilkowski Mfg. Co., Watertown, Wis.

Copper.
American Brass Co., Waterbury, Conn.
Copper & Brass Research Association, New York

Cornices.
Friedley-Voshardt Co., Chicago, Ill.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Cutting Blowpipes.
Oxweld Acetylene Co., New York, N. Y.

Cut-offs—Rain Water.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Dampers—Quadrants—Accessories.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
L. J. Mueller Furnace Co., Milwaukee, Wis.
Parker-Kalon Corp., New York, N. Y.
Stover Mfg. & Engine Co., Freeport, Ill.

Damper Regulators.
National Regulator Co., Chicago, Ill.
H. M. Sheer Co., Quincy, Ill.

Dies—Punch & Press.
La Salle Machine Works, Chicago, Ill.

Diffuser—Air Duct.
Aeolus-Dickinson Co., Chicago, Ill.
L. C. Mueller Furnace Co., Milwaukee, Wis.

Doors—Metal.
Lupton's Sons Co., David, Philadelphia, Pa.

Drive Screws—Hardened Metallic.
Parker-Kalon Corp., 200 Varick St., New York

Eaves Trough.
Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Berger Co., L. D., Philadelphia, Pa.
Burton Co., The W. J., Detroit, Mich.
Lupton's Sons Co., David, Philadelphia, Pa.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
New Jersey Zinc Sales Co., The, New York, N. Y.
Wheeling Corrugating Co., Wheeling, W. Va.

Elbows and Shoes—Conductor.
Barnes Metal Products Co., Chicago, Ill.
Dieckmann Co., Ferdinand, Cincinnati, Ohio
Lupton's Sons Co., David, Philadelphia, Pa.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Wood Faces—Cold Air.
Auer Register Co., Cleveland, Ohio
American Wood Register Co., Plymouth, Ind.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Fences.
American Steel & Wire Co., Chicago, Ill.

Fittings—Conductor.
Barnes Metal Products Co., Chicago, Ill.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Flanges.
Chicago Metal Mfg. Co., Chicago, Ill.

Fittings—Steel Pipe.
Chicago Metal Mfg. Co., Chicago, Ill.

Flue Thimbles.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Furnace Cement—Asbestos
Connors Paint Mfg. Co., Wm., Troy, N. Y.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Furnace Cement—Liquid.
Technical Products Co., Pittsburgh, Pa.

Furnace Cleaners—Suction.
Brillion Furnace Co., Brillion, Wis.

Furnace Coloring (Enamel).
B & F Mfg. Co., Des Moines, Iowa

Furnace Fans.
A. H. Robinson Co., Massillon, Ohio
Warm Air Furnace Fan Co., The, Cleveland, Ohio
Williamson Heater Co., Cincinnati, Ohio

Furnace Fuse.
National Regulator Co., Chicago, Ill.

Furnace Regulators.
National Regulator Co., Chicago, Ill.
H. M. Sheer Co., Quincy, Ill.

Furnace Rings.
Forest City-Walworth Run Foundries Co., Cleveland, O.
Milwaukee Corrugating Co., Milwaukee, Wis.

Furnaces—Gas.
Mueller Furnace Co., L. J., Milwaukee, Wis.

Furnaces—Warm Air.
Agricola Furnace Co., Gadsden, Ala.
American Furnace Co., St. Louis, Mo.
Beckwith Co., The, Dowagiac, Mich.
Brillion Furnace Co., Brillion, Wis.
Colburn Heater Co., Chicago, Ill.
Floral City Heater Co., Monroe, Mich.
Forest City-Walworth Run Fdy. Cleveland, Ohio
Fox Furnace Co., Elyria, Ohio
Henry Furnace & Fdy. Co., Cleveland, Ohio
Hess-Snyder Co., Massillon, Ohio
Homer Furnace Co., Coldwater, Mich.
International Heater Co., Utica, New York
Lennox Furnace Co., Marshalltown, Ia.; Syracuse, N. Y.
May-Fiebeger Furnace Co., Newark, Ohio
Meyer Furnace Co., The, Peoria, Ill.
Midland Furnace Co., Columbus, Ohio
Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.
Mueller Furnace Co., L. J., Milwaukee, Wis.
Richardson & Boynton Co., New York, N. Y.
Robinson Co., A. H., Massillon, Ohio
Rudy Furnace Co., Dowagiac, Mich.
Rybolt Heater Co., Ashland, Ohio
Standard Furnace & Supply Co., Omaha, Neb.
Success Heater Mfg. Co., Des Moines, Ia.
Thatcher Co., Chicago, Ill.
XXth Century Heating & Ventilating Co. Akron, Ohio
Waterman-Waterbury Co., Minneapolis, Minn.
Western Steel Products Co., Duluth, Minn.
Williamson Heater Co., Cincinnati, Ohio
Wise Furnace Co., Akron, Ohio

Gas (Acetylene) Dissolved
Prest-O-Lite Co., Inc., New York, N. Y.

Gas (Nitrogen).
Linde Air Products Co., New York, N. Y.

Gas (Oxygen).
Linde Air Products Co., New York, N. Y.

Glass—Wire.
Lupton's Sons Co., David, Philadelphia, Pa.

Grilles.
Auer Register Co., Cleveland, Ohio
Harrington & King Perforating Co., Chicago, Ill.
Hart & Cooley Co., New Britain, Conn.
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Heat Regulation Systems.
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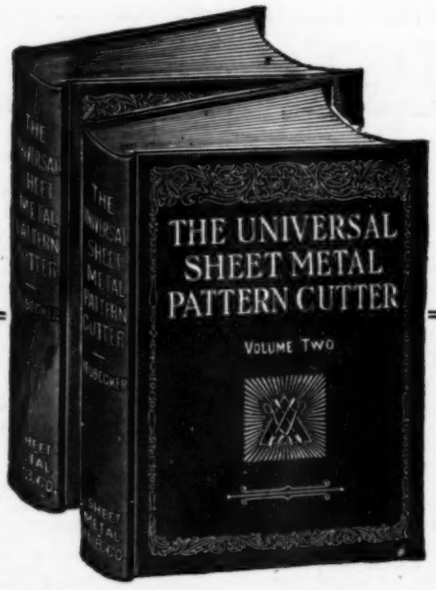

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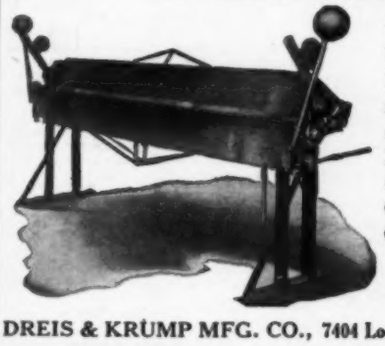

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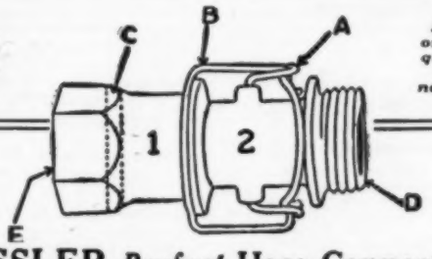

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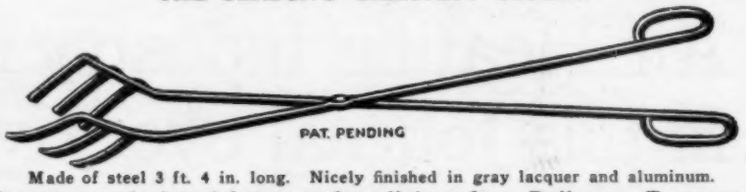

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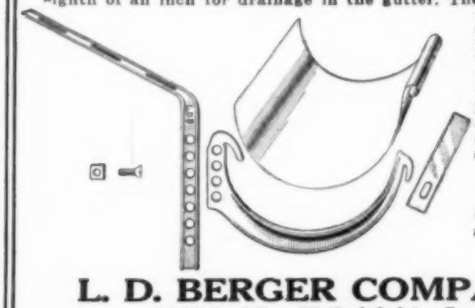

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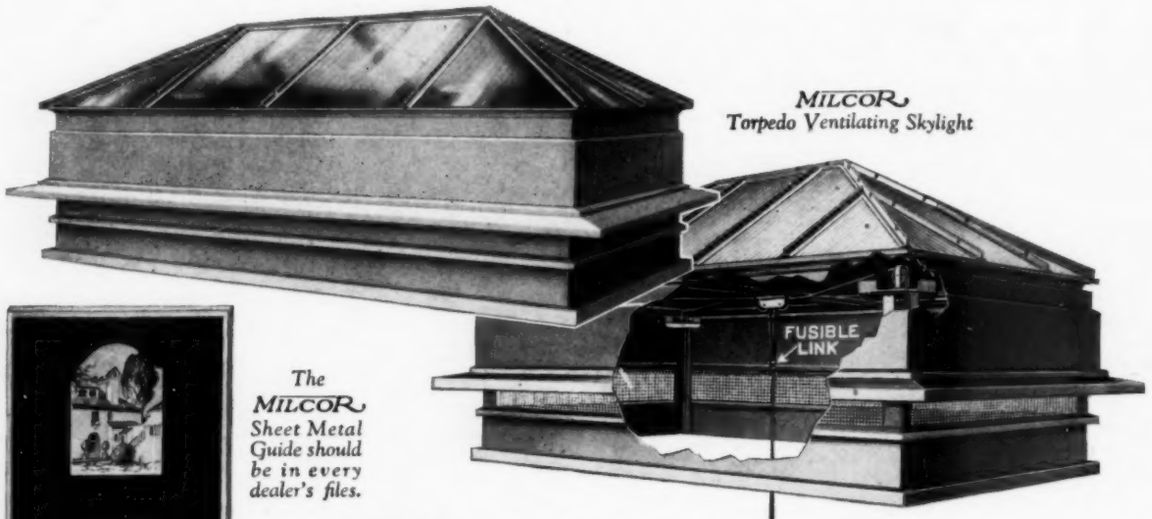

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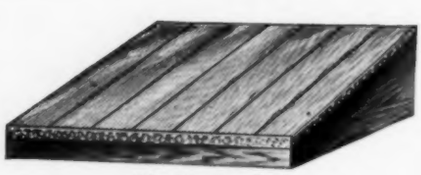

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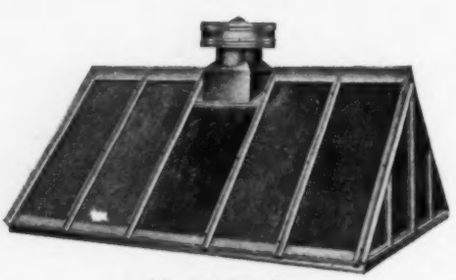
No. 883 Standard



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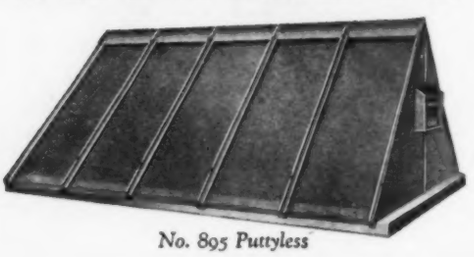

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